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# Oil and Gas Well Blowout Report

## Events of 1986

July 1987



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# Oil and Gas Well Blowout Report

## Events of 1986

July 1987

ENERGY RESOURCES CONSERVATION BOARD  
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## SUMMARY - OIL AND GAS WELL BLOWOUT REPORT - 1986

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The main purpose of this report is to provide information about blowouts. To that end a summary for each blowout that occurred in 1986 is provided and an historical summary is presented for the past 10 years. However, to round out the oil and gas operations, the report contains statistical information on wells licensed and drilled, drilling rig inspections, and other events that occur while drilling, servicing, and operating wells. The definitions of terms used in the statistical portions of this report are found in the sections that relate directly to those terms.

This is the third annual edition of this report. The Board considers the publication of this information to be a constructive way to improve the level of understanding of many aspects of well control and drilling occurrences, and the ERCB role in this matter.

### 1986 Summary

In 1986, approximately 4495 wells were drilled by about 490 active drilling rigs. Most of the drilling activity occurred at the beginning and at the end of the year. Only 2 blowouts occurred while drilling the 4495 wells. There were 16 blowouts among approximately 79 000 active wells. During the year the ERCB made 1980 inspections of drilling rigs, including 130 inspections of 34 critical sour wells. Details and comments respecting these operations are provided in the respective sections of this report.

#### 1 Drilling Well Blowouts

The 2 blowouts at drilling wells in 1986 both occurred on oil sands wells. The first one was as a result of lost circulation causing a reduction in the hydrostatic pressure in the well allowing a lower zone to invade the wellbore and blow the remaining mud out of the hole. A producing well on the same location was responsible for the reduced formation pressure that led to the lost circulation problem. The second incident occurred when an unexpected abnormally pressured zone, caused by communication from adjacent wells on steam injection cycle, was drilled into.

In 1985, there was 1 blowout while drilling about 8500 wells. During the last 10 years, there have been 24 blowouts, 5 of which were sour. The drilling industry continues to strive for the best possible drilling practices and the 1986 statistics show that this is limiting the number of blowouts.

## 2 Active Well Blowouts

The 16 blowouts in 1986 at the 79 000 active wells were distributed as follows:

Oil sands wells	4
Producing oil wells	2
Producing gas wells	1
Shut-in gas wells	5
Shut-in oil wells	<u>4</u>
 Total	<u>16</u>

Two of the blowouts resulted in the release of sour gas, 1 shut-in oil well, and 1 shut-in gas well. Neither one of these blowouts released a great volume of sour gas and both wells were controlled in 7 hours or less.

At 10 of the blowouts, control was regained in 24 hours or less. The other 6 took longer, with the longest taking 11 days to regain control. None of these blowouts had any adverse effects on nearby residents.

Equipment failure was the most common cause of blowouts (8 cases), followed by working procedure shortcoming (5 cases). Damage to a well facility by other operations (2 cases) was the third leading cause. The cause of the Lac Mineral blowout that occurred in August is not included here because it is still under investigation.

At active wells in 1986, there were 16 blowouts compared to 21 in 1985. In both years, a significant portion of the blowouts occurred at oil sands wells. However, the 4 occurrences in 1986 was a reduction, by more than half, compared to 1985 when there were 10 such occurrences. As noted in 1985, two major reasons for the increased incidence of blowouts for this well category are an increase in oil sands well activity and a more exacting definition adopted by the ERCB which results in virtually any loss of control at a well being defined as a blowout.

Having regard for the definitional changes and the minor nature of the blowouts at the oil sands wells, the Board concludes that actual performance in 1986 was comparable to previous years. It is apparent that there is a growing inventory of active wells, and the fact that the leading cause of blowouts is equipment failure indicates the need for regular maintenance programs for all active wells.

### 3 ERCB Drilling Rig Inspections

In 1986, the ERCB conducted 1980 inspections of drilling rigs, of which 255 (13 per cent) were unsatisfactory; 152 (8 per cent) of these unsatisfactory inspections were identified to be serious. When serious deficiencies were identified, the drilling rigs were shut down until the deficiencies were remedied. One hundred thirty of the inspections were for rigs drilling critical sour wells. Only 2 inspections (2 per cent) were unsatisfactory and 1 had a serious deficiency.

In 1985, the ERCB made 2447 inspections, of which 558 (23 per cent) had deficiencies with 327 being serious. There were 88 inspections of critical sour wells, 2 (2.5 per cent) were unsatisfactory and none were serious.

The performance of the crews drilling critical sour wells in 1986 was again commendable. The performance of crews on other wells has continued to show a marked improvement from year to year. The ERCB will continue to place a high priority on rig inspections on all types of wells.



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 1 BLOWOUTS
 

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A blowout is defined as a complete loss of control of a flow of fluids (gas, oil, water, mud, steam, etc) from a well. Like accidents it is an event that has been caused often as a result of other events during the operation of wells. In drilling operations, blowouts develop from one or a combination of lost circulation, kicks, and blows when improper procedures are used or equipment failures occur. It is similar in servicing and production operations where a blow or a leak can escalate into a blowout as a result of improper procedures or equipment failures. Third-party damages to a producing or shut-in well may result in a blowout. Section 4 covers the full scope of these events and defines the terms used. This section focuses on blowouts using information from Section 4.

The following table, 1.1, summarizes the 18 blowouts that occurred in 1986 and provides a similar summary for 1985. The operation in progress at the time of the blowout, the cause of the blowout, and any sour fluid release are presented. An historical summary of blowout occurrences, from 1986 to 1977, is provided in 1.2.

## 1.1 Blowouts - 1986 and 1985

## 1.1.1 1986 Blowouts\*

<u>Operation</u>	<u>Causes</u>	<u>Sour Fluid/Gas Release</u>
Drilling - 2	Abnormally high pressured shallow zone - 2	None
Servicing - 4	Equipment failure - 1 Procedure shortcoming - 2 Not determined - 1#	1 None None
Other - 12	Third-party damage - 2 Equipment and/or procedure shortcoming - 10	None 1
Total	18	2

\* Injuries occurred in association with 2 of the 1986 blowouts; there were 9 injuries of which 2 were fatal (injuries for the Lac Mineral incident are included).

# The Lac Mineral blowout is still under investigation.

## 1.1.2 1985 Blowouts\*

<u>Operation</u>	<u>Causes</u>	<u>Sour Fluid/Gas Release</u>
Drilling - 1	Unexpected shallow gas zone - 1	None
Servicing - 6	Equipment failure - 2	1
	Procedure shortcoming - 4	None
Other - 15	Third-party damage - 4	1
	Fire (lightning and static electricity) - 2	None
	Equipment and/or procedure shortcoming - 9	3
<b>Total</b>	<b>22</b>	<b>5</b>

\* Injuries occurred in association with 3 of the 1985 blowouts; a total of 4 people were injured.

## 1.2 Blowout Occurrences (Historical Statistics) 1986 to 1977

	<u>Drilling</u>			<u>Servicing</u>			<u>Other</u>		
	<u>Sweet</u>	<u>Sour</u>	<u>Total</u>	<u>Sweet</u>	<u>Sour</u>	<u>Total</u>	<u>Sweet</u>	<u>Sour</u>	<u>Total</u>
1986	2	0	2	3	1	4	11	1	12
1985	1	0	1	5	1	6	11	4	15
1984	4	0	4	4	0	4	5	2	7
1983	0	1	1	2	1	3	8	1	9
1982	3	1	4	1	3	4	7	1	8
1981	1	1	2	2	1	3	7	1	8
1980	2	0	2	5	0	5	2	1	3
1979	2	0	2	5	0	5	3	2	5
1978	0	0	0	2	1	3	7	1	8
1977	4	2	6	3	0	3	3	1	4
<b>Total</b>	<b><u>19</u></b>	<b><u>5</u></b>	<b><u>24</u></b>	<b><u>32</u></b>	<b><u>8</u></b>	<b><u>40</u></b>	<b><u>64</u></b>	<b><u>15</u></b>	<b><u>79</u></b>

### 1.3 Blowout Discussion

As discussed in Section 4.2 of this report, some of the older statistics are not considered consistent with 1986 to 1984 statistics. Also, each year there are variations in the number of different operations conducted, such as the large increase in steam-assisted crude bitumen recovery operations. The increased interest in blowouts and related occurrences appears to have resulted in more events of a minor nature now being reported to the ERCB.

Both of the blowouts that occurred at a drilling well in 1986 took place at oil sands wells on multi-well pads. The first of these blowouts occurred when a decrease in the rig pump pressure combined with lost circulation reduced the hydrostatic pressure in the wellbore allowing formation fluids to enter the wellbore and resulting in a blowout. The lost circulation problem was attributed to drilling into a reservoir that had been drained by a well on the same location. It took approximately 9 hours to mix and pump lost circulation and weight material to regain control of the well. The second incident occurred when an abnormally high pressured zone was encountered. The apparent cause of the unexpected high-pressure zone was communication between zones on steam injection. It took approximately 24 hours to sufficiently build the mud weight to regain control of the well. Neither of these incidents had an adverse affect on the environment or nearby residents.

In 10 of the blowouts, control was regained in less than 24 hours. All but 1 of the remaining blowouts were controlled in 4 days or less; the other well took 11 days to regain control. The 2 blowouts which were considered sour were both under control in 7 hours or less. Although all of these blowouts were considered minor occurrences, it is emphasized that "minor occurrence" is a relative term because all blowouts are considered serious occurrences. In all of these blowouts, the release of fluids was small.

Nine of the blowouts occurred on shut-in gas or oil wells, 4 at oil sands operations, and the remaining 3 at producing gas or oil wells. The most common cause for blowouts was equipment and/or procedures shortcoming which accounted for 13 incidents. Third-party damage and abnormally high pressured zones accounted for 2 blowouts while the remaining blowout was a result of equipment failure.

Of the 22 blowouts in 1985, only 1 on a drilling well was considered moderately serious. Five blowouts on producing wells involved a release of sour fluids, all but 1 of which had an H<sub>2</sub>S concentration of less than 1 per cent. The only well which had a higher H<sub>2</sub>S concentration was the Rainbow blowout, which was out of control for 6 days.

Comparing 1986 to 1985, it is observed that

- o there were no major blowouts in either year but 1986 had 2 moderately serious blowouts, while 1985 had 1 moderately serious blowout;
- o while the Lac Mineral well blowout was considered only moderately serious in terms of release rate or difficulty in regaining control, it was disastrous in terms of loss of two lives and serious injuries to workers. The other moderately serious blowout was Dome 5A2 Lindbergh where during the blowout, gas was coming to surface around the conductor pipe;
- o in 1986, 2 blowouts occurred while drilling some 4495 wells and 1 blowout occurred in 1985 drilling 8500 wells;
- o 2 blowouts in 1986 and 5 in 1985 had a release of sour fluids;
- o the distribution of blowouts among types of active wells was

	<u>1986</u>	<u>1985</u>
Oil Sands Well	4	10
Producing Oil Well	2	3
Producing Gas Well	1	3
Shut-in Gas/Oil Well	<u>9</u>	<u>5</u>
Total	<u><u>16</u></u>	<u><u>21</u></u>

- o the causes of both drilling and active well blowouts in both years fall into three main categories as shown below:

	<u>1986</u>	<u>1985</u>
Equipment failure	11	10
Procedure shortcoming	2	5
Third-party damage	2	4
Other	<u>3</u>	<u>3</u>
Total	<u><u>18</u></u>	<u><u>22</u></u>

- o during 1986, there was 1 serious severe abnormal pressure encountered, which, because of the incidents that took place regarding this occurrence, has been included at the end of the "Blow/Blowout Summaries" in Section 4.3.

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## 2      WELLS LICENSED AND DRILLED

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The ERCB licensed 4620 wells in 1986. A distribution of the licensed wells by month and by the intended purpose is shown in 2.1.1 and 2.1.2, respectively. In addition, a depth distribution is set out in 2.1.3 (graph) and 2.1.4 (table). Some 4495 wells were drilled in 1986. By year-end 1986, there were about 79 000 active wells of a total of 114 000 wells that have been drilled in Alberta.

A 5-year historical distribution of wells licensed is presented in 2.2. Ten-year historical statistics are provided in 2.3 for wells licensed and drilled, along with the number of active wells at the end of each year. The latter includes all wells except those that have been abandoned.

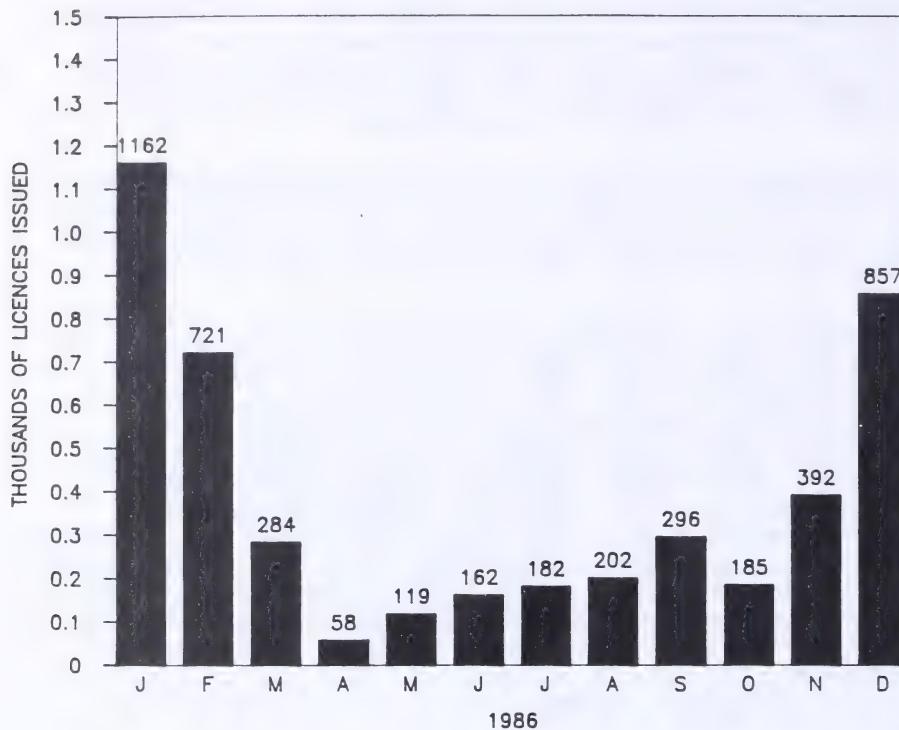
All well licence applications are required to address the potential of encountering sour hydrocarbons (oil or gas that contains H<sub>2</sub>S) and assess the potential flow rate of any proposed sour wells. In considering applications for well licences, the ERCB reviews the potential of encountering sour hydrocarbons. As a result of these combined efforts, of the wells licensed in 1986, 78 per cent were considered potential sweet wells (little or no H<sub>2</sub>S potential) and 22 per cent had potential to be sour wells. Further detailed review of the latter wells resulted in 42 wells being considered as critical sour wells\* that required a complete review of the drilling plan and the emergency response plan for each of those wells. Some statistics on the potential distribution of sour wells considered in 1986 are presented in 2.4.

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\* For a complete definition of a critical sour well, please refer to ERCB Publication Decision Report D 84-5, Appendix 5.

## 2.1 WELLS LICENSED - 1986

## 2.1.1 Wells Licensed by Month



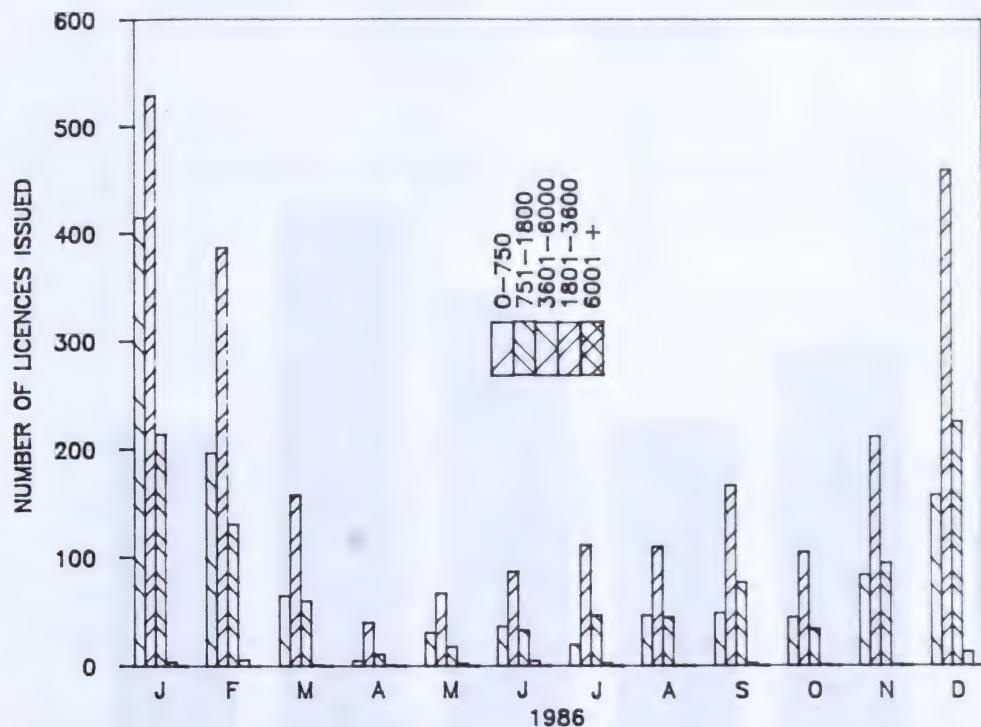
## 2.1.2 Purpose of Wells Licensed - 1986

<u>Intended Purpose</u>	<u>Wells</u>
Oil and Gas Conventional	4 245
Oil Sands	250
Experimental*	87
Others#	38
<hr/>	<hr/>
Total	4 620
<hr/>	<hr/>

\* Mostly for oil sands operations.

# Test holes, farm gas wells, industrial water wells, and domestic water wells.

### 2.1.3 Wells Licensed by Depth/Month

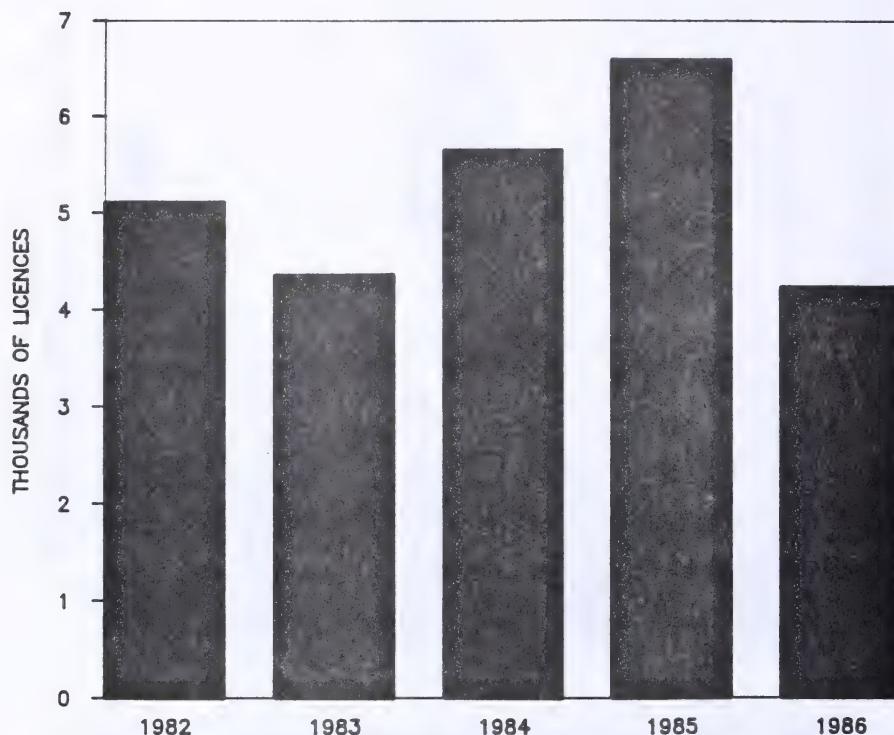


### 2.1.4 Wells Licensed by Depth/Month (Same information as in graph 2.1.3)

Month	Depth (m)				
	0-750	751-1800	1801-3600	3601-6000	6001+
Jan	415	529	214	4	0
Feb	197	387	131	6	0
Mar	65	158	60	1	0
Apr	5	40	11	1	0
May	31	67	18	3	0
June	37	87	33	5	0
July	20	112	47	3	0
Aug	47	110	45	0	0
Sept	49	167	77	3	0
Oct	45	105	34	1	0
Nov	84	212	95	1	0
Dec	<u>158</u>	<u>460</u>	<u>226</u>	<u>13</u>	<u>0</u>
Total	<u>1 153</u>	<u>2 434</u>	<u>991</u>	<u>41</u>	<u>0</u>

## 2.2 DISTRIBUTION OF WELLS LICENSED (Historical)

## 2.2.1 Conventional Wells Licensed



## 2.3 WELLS LICENSED AND DRILLED - 1986 to 1977

	<u>Licensed*</u>	<u>Drilled*</u>		<u>Active* Wells</u>
		<u>Conventional</u>	<u>Oil Sands</u>	
		<u>Oil &amp; Gas</u>	<u>(Estimates)</u>	
1986	4 620	4 245	200	79 000
1985	8 763	6 600	1 800	76 000
1984	7 178	5 660	950	70 000
1983	4 935	4 367	280	66 000
1982	5 807	5 122	310	62 000
1981	6 265	5 834	260	59 000
1980	7 820	7 048	340	53 000
1979	6 391	5 780	N/A <sup>#</sup>	47 000
1978	5 989	5 573	N/A	42 000
1977	5 637	5 130	N/A	39 000

\* The difference between wells licensed and wells drilled can be attributed to well licence cancellations (up to 5 per cent in some years); oil sands well counts are estimated, and not all wells are drilled in the same calendar year as they are licensed. Also note that the addition of drilled wells to the active wells will not equate because of abandoned wells.

# Reliable estimates not available.

## 2.4 SOUR WELL LICENSING ACTIVITY - 1986

Total Wells Licensed	4 620
Potential Sweet Wells	3 594
Potential Sour Wells	1 026
Potential Release Rate of H <sub>2</sub> S	
- Less than 0.3 m <sup>3</sup> /s	891
- 0.3 to 2.0 m <sup>3</sup> /s	104
- Greater than 2.0 m <sup>3</sup> /s	<u>31</u>
Total	<u>1 026</u>
Critical Sour Wells	42
Potential Release Rate of H <sub>2</sub> S	
- Less than 2.0 m <sup>3</sup> /s	11
- Greater than 2.0 m <sup>3</sup> /s	<u>31</u>
Total	<u>42</u>



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### 3 DRILLING RIG INSPECTIONS

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This section provides statistics on the ERCB's drilling rig inspection activities for the years 1982 to 1986. Rig inspections are a primary function of the area offices. The intent of an inspection is to ensure that the rig is suitably equipped and personnel properly trained and certified to maintain control of the well regardless of the operation in progress.

The ERCB does not provide staff for inspection of every well that is drilled. A selection criteria is used where emphasis is placed on rigs with poor performance histories, rigs drilling sour wells, start of winter operations, and environmentally sensitive locations. Therefore, the results of the approximately one-third coverage must not be extrapolated to all the wells and cannot be interpreted as representative of overall drilling rig quality in the province. However, the results do indicate where emphasis should be placed to improve rig quality. Drilling operations on many oil sands wells are not included in these statistics.

In 1984, the inspection guidelines were reviewed and became more stringent, particularly for sour wells. In addition, a better working definition of a "serious unsatisfactory inspection" rating was adopted and is as follows:

"Where a deficiency occurs subsequent to the initial drill out after setting surface casing, which could contribute to an operational failure of the blowout prevention equipment or may restrict the crew's ability to safely detect, shut in the well, and/or circulate out a well kick and maintain control of the well."

When a serious deficiency is identified the drilling operations are shut down until the deficiency is remedied.

The Oil and Gas Conservation Regulations classifies wells according to drilling depth in defining blowout prevention requirements for drilling operations:

<u>Class</u>	<u>Proposed Drilling Depth</u>
I	Shallow well in which no surface casing is set
II	Less than 750 metres
III	Greater than 750 metres, less than 1800 metres
IV	Greater than 1800 metres, less than 3600 metres

<u>Class</u>	<u>Proposed Drilling Depth</u>
V	Greater than 3600 metres, less than 6000 metres
VI	Greater than 6000 metres

Rig inspection coverage and results are presented by these well classifications in 3.1. The most frequently identified deficiencies on the inspections are identified in 3.3. A copy of the rig inspection form used by the EkCB's inspectors is provided in 3.4.

Emphasis was placed on inspecting sour wells, particularly critical sour wells. In 1986, each critical sour well was inspected at least three times. The results of these inspections are presented in 3.2.

### 3.1 Drilling Rig Inspections

#### 3.1.1 Summary for 1986

Wells spudded*	4 685
Active rigs	490#
Inspections	1 980
Unsatisfactory inspections	255

\* Spudded means commenced drilling.

# 530 rigs drilled at least one well in Alberta but 490 is a better indication of active rigs in the province.

#### 3.1.2 Inspection Coverage and Results by Well Class - 1986

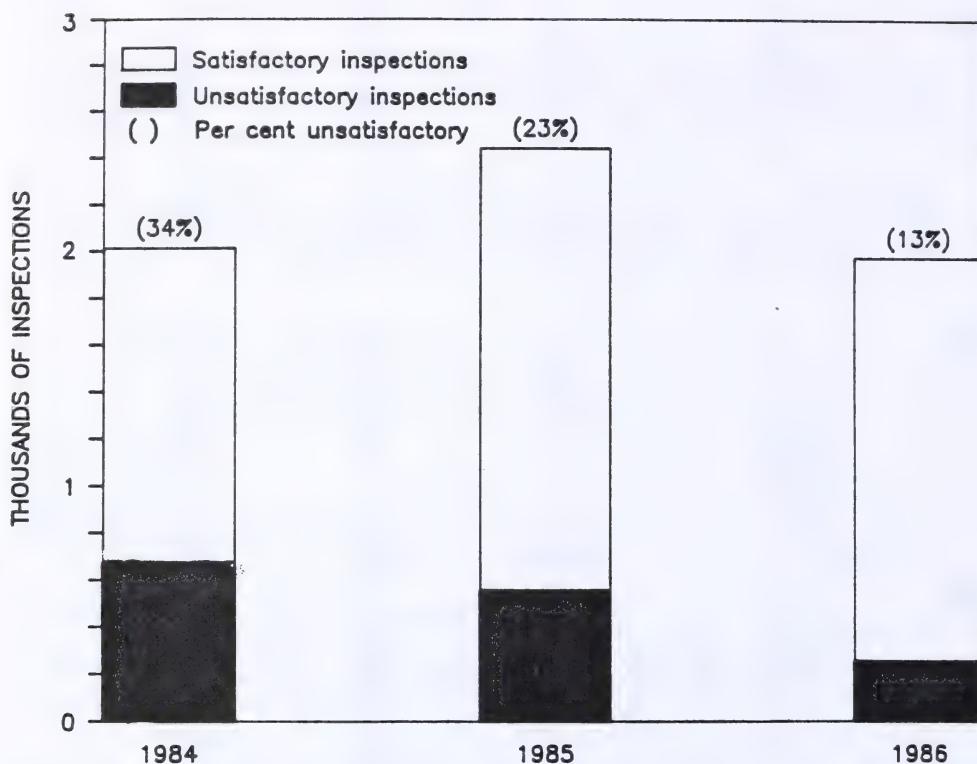
Well Class	Wells Spudded	Inspections	Total Unsatisfactory Inspections#	Serious Unsatisfactory Inspections#
I	312	16	2	0
II	882	176	37	24
III	2 459	984	134	86
IV	991	696	82	53
V	41	108	0	0
VI	0	0	0	0
	<u>4 685</u>	<u>1 980</u>	<u>255</u>	<u>152</u>

# The most frequent deficiencies are itemized in 3.3.1 and 3.3.2.

## 3.1.3 Inspection Coverage and Results by Well Class - 1985 to 1982

Year	Well Class	Wells Spudded	Inspections	Unsatisfactory Inspections
<u>1985</u>	I	817	24	9
	II	2 364	321	98
	III	3 371	1 149	283
	IV	1 433	886	164
	V	28	67	0
	VI	—	—	—
		<u>8 013</u>	<u>2 447</u>	<u>558</u>
<u>1984</u>	I	567	35	18
	II	1 458	189	76
	III	2 851	918	312
	IV	1 224	824	269
	V	16	52	4
	VI	—	—	—
		<u>6 116</u>	<u>2 018</u>	<u>679</u>
<u>1983</u>	I	84	18	7
	II	1 367	210	79
	III	2 178	747	259
	IV	960	647	214
	V	22	42	1
	VI	—	—	—
		<u>4 611</u>	<u>1 664</u>	<u>560</u>
<u>1982</u>	I	6	—	—
	II	2 134	269	137
	III	2 226	765	294
	IV	918	518	210
	V	22	34	6
	VI	—	—	—
		<u>5 306</u>	<u>1 586</u>	<u>647</u>

## 3.1.4 Drilling Rig Inspections - 1984 to 1986



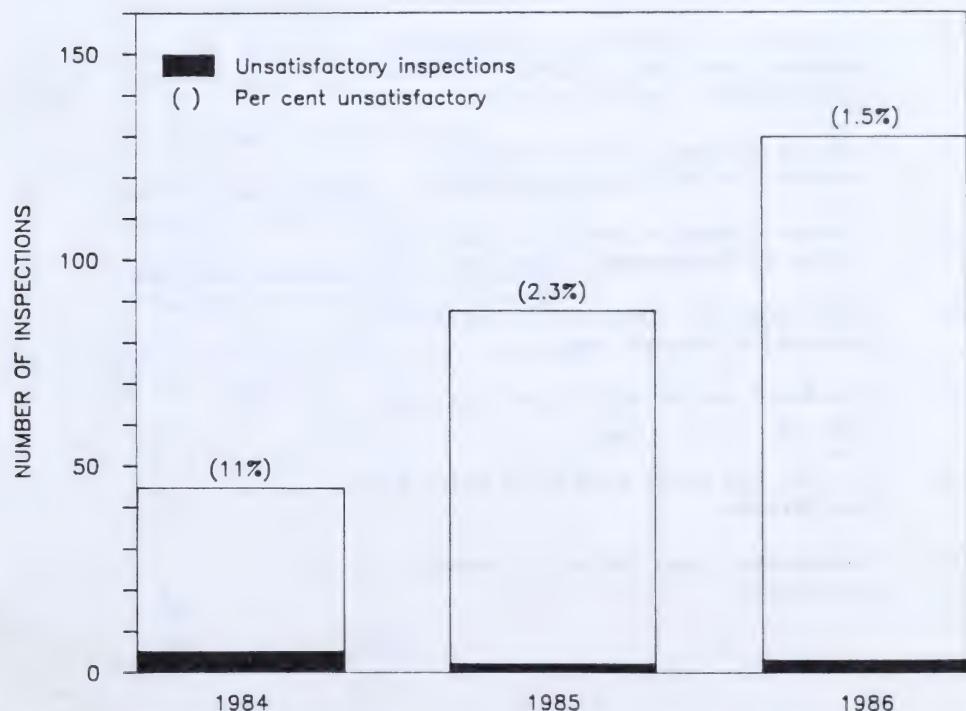
### 3.2 Critical Sour Well Drilling Rig Inspection Coverage Results

#### 3.2.1 Inspection Coverage and Results - 1986 to 1984

Year	Wells Licensed	Wells Spudded	Wells Drilling at Year-end	Inspections	Unsatisfactory Inspections
1986	42	34	12	130*	2 (1 serious)
1985	31	29	7	88	2 (0 serious)
1984	14	13	3	45	5 (4 serious)

\* Thirty-three inspections were conducted on CDN-SUP HINTON 7-18-52-2 W5, over a period of 268 days, all of which were satisfactory. The reason for this many inspections on one location was due to the extremely sensitive nature and location of this well.

#### 3.2.2 Critical Sour Well Drilling Rig Inspection Coverage and Results - 1986 to 1984



## 3.3 Rig Inspection Deficiency Items - 1986 Inspections

## 3.3.1 Most Frequent Serious Deficiency Items - 1986 Inspections

Item	Percentage of Total Serious Items
1 Trip records not completed or being completed incorrectly	11
2 Well control data not provided (eg, maximum back pressure to be held on casing)	10
3 BOPs or hydraulic valve failed to operate from remote position	10
4 Mud-tank level monitoring device not operating during drilling or tripping	8
5 Crew training inadequate	8
6 Remote drill pipe pressure not provided at manifold and/or remote drill pipe pressure gauge inaccurate	7
7 Accumulator precharge, or operating pressure, too low to operate annular preventer and hydraulic valve	7
8 BOPs or hydraulic valve failed to operate from driller's position	5
9 Pressure gauge in manifold inaccurate (gauge or incremental range too low)	5
10 Flare line not connected to manifold, secured, or staked down	3
11 Bleed-off and/or kill lines seriously iced up	3
12 Driller has never held PITS First Line Certificate	3
13 Accumulator pump failed to recharge accumulator	<u>3</u>
Total	<u>84</u>

## 3.3.2 Most Frequent Significant Deficiency Items - 1986 Inspections

Item	Percentage of Total Significant Items
1 Diesel engine shut-offs failed to stop engines	25
2 Flare line did not terminate in the flare pit	5
3 Degasser pressure relief line does not terminate in flare pit	5
4 Incomplete pressure test data recorded in the tour reports	4
5 BOP handwheels not available or incorrectly sized	4
6 Accumulator pump failed to recharge accumulator	4
7 Flare pit improperly constructed	4
8 Crew BOP drills not recorded in tour reports	3
9 H <sub>2</sub> S warning sign not posted	3
10 Weekly diesel engine shut-off test not recorded in tour reports	3
11 Line from manifold to degasser not connected or improperly connected	3
12 Daily mechanical tests not recorded in tour reports	<u>3</u>
Total	<u><u>66</u></u>

### 3.4 RIG INSPECTION FORM

<b>DRILLING &amp; SERVICING OPERATIONS INSPECTION REPORT</b>													
<b>GENERAL INFORMATION</b>													
CONTRACTOR NAME				NUMBER		RIG NO		RIG TYPE		WELL ID			
				1	5	8	9	10	1	LE	LSD		
OPERATOR NAME				NUMBER		INVESTIGATION TYPE (CIRCLE)		SEC		TWP			
				24	28	PARTIAL	COMPLETE	30	31	32	33		
RIG MANAGER				CURRENT DEPTH (m)		PROJECT T.D. (m)		SURFACE		CASING SETTING DEPTH (m)		RIG STATUS	
								INTERMEDIATE		PRODUCTION			
<b>MECHANICAL TESTS</b> DESCRIBE ALL TESTS CONDUCTED INCLUDING LOCATION OF EQUIPMENT AND CONTROLS													
ACCUMULATOR		RECHARGE PUMP		BOP CONTROLS		BOP		TIME TO OPERATE		PRESSURE TEST (kPa)			
MAKE	N° BOTTLES	TIME	NO ON FLOOR	min.	TYPE	ANNULLER/HCR		s	LOW	TIME	HIGH	TIME	
CAPACITY		N° BOTTLES	NO REMOTE			RAM	1	1	1	1	1	1	
DESIGN PRESSURE		NUMBER	TYPE			RAM	1	1	1	1	1	1	
PRECHARGE PRESSURE		PRESSURE	DISTANCE	1	m	RAM	1	1	1	1	1	1	
PRESSURE BEFORE			HAND WHEELS			MANIFOLD	1	1	1	1	1	1	
PRESSURE AFTER													
<b>INSPECTION RESULTS</b> (CODE: significant - 1; serious - 2; both - 3; satisfactory - x)													
YES NO													
<input type="checkbox"/> 50 RIG APPEARS SATISFACTORY?													
BOP SYSTEM													
<input type="checkbox"/> 51 WITNESSED BOP PRESSURE TEST?													
<input type="checkbox"/> 52 BOP TYPE, RAM SIZE & PRESSURE RATING SATISFACTORY? *													
<input type="checkbox"/> 53 BLEED OFF & KILL LINES APPEAR SATISFACTORY? *													
<input type="checkbox"/> 54 NON-STEEL HYDRAULIC LINES FIRE SHEATHED?													
<input type="checkbox"/> 55 DRILL STRING VALVES READILY ACCESSIBLE?													
<input type="checkbox"/> 56 EQUIPMENT ADEQUATELY HEATED? *													
<input type="checkbox"/> 57 BOP CONTROLS ADEQUATE? *													
<input type="checkbox"/> 58 BOP EQUIP WORKABLE & PROPERLY CONNECTED? *													
<input type="checkbox"/> 59 DRILL STRING PRESSURE AVAIL AT CHOKE CONTROL? *													
<input type="checkbox"/> 60 MUD-GAS SEPARATOR ADEQUATELY CONNECTED?													
<input type="checkbox"/> 61 REQ'D CASING WEAR TESTS BEING PERFORMED?													
TRAINING & PROCEDURES													
<input type="checkbox"/> 70 DRILLER HAS PITS FIRST LINE CERTIFICATE? *													
<input type="checkbox"/> 71 CREW BOP TRAINING APPEARS SATISFACTORY?													
<input type="checkbox"/> 72 MUD VOL MEAS & HOLE FILL PROCEDURES SATISFACTORY?													
<input type="checkbox"/> 73 PERSON READILY AVAILABLE WITH PITS SECOND LINE CERTIFICATE? *													
<input type="checkbox"/> 74 PERSON ON LEASE WITH PITS WELL SERVICING CERTIFICATE? *													
RIG OTHER													
<input type="checkbox"/> 80 WELL TO FLAME TYPE EQUIPMENT 25m?													
<input type="checkbox"/> 81 SMOKING RULES BEING OBSERVED 25m?													
<input type="checkbox"/> 82 DST EQUIPMENT SATISFACTORY?													
<input type="checkbox"/> 83 WARNING SIGNS POSTED IN H,S AREAS?													
<input type="checkbox"/> 84 BOP PRESSURE TESTS RECORDED & TEST PROCEDURES SATISFACTORY?													
<input type="checkbox"/> 85 DAILY MECHANICAL TESTS RECORDED?													
<input type="checkbox"/> 86 WEEKLY DIESEL ENGINE TESTS RECORDED?													
ENGINES													
<input type="checkbox"/> 90 DIESEL ENGINE SHUT-OFFS STOP ALL ENGINES?													
<input type="checkbox"/> 91 ENGINE EXHAUSTS SATISFACTORY?													
REMEDIAL ACTION REQUIRED													
INSPECTOR'S INITIALS													
AREA OFFICE		BOARD REPRESENTATIVE		CONTRACTOR REPRESENTATIVE		OPERATOR REPRESENTATIVE		RIG DOWN TIME					

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**4 DRILLING OCCURRENCES**

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Drilling occurrences are abnormal or non-routine conditions or events that may be encountered while drilling or operating a well. They may be contributing factors in maintaining efficient operations or in controlling a well if hydrocarbons are present. When encountered, and depending on severity, conditions such as lost circulation and kicks may require special consideration to prevent occurrences such as blows or blowouts. Water flows encountered while drilling, usually at shallower depths, must be stopped before drilling deeper to avoid problems in maintaining hole integrity.

A summary of drilling occurrences encountered while drilling wells in 1986 involving lost circulation, kicks, blows, and blowouts for various depth categories are presented in 4.1.1. An historical summary of similar information, including water flows, is presented in 4.1.2. Table 4.1.3 presents an analysis of drilling occurrences by depth for all wells drilled in the period 1986 to 1975 inclusive. The analysis covers the drilling operations of only some 71 500 wells and it should be recognized that more than one occurrence took place in some wells.

Sections 4.2, 4.3, and 4.4 address blow and blowout occurrences for well servicing and other operations as well as drilling. The numbers of blow and blowout occurrences, along with the operation being conducted at the time of the occurrence, are summarized in 4.2.1 for 1985. A summary of the causes of blows and blowouts by operation is presented in 4.2.2 and a similar tabulation appears in 4.2.3 for any sour fluids release that occurred during a blow or blowout. A 10-year historical summary of blow and blowout occurrences is provided in 4.2.4.

A summary of each of the 8 blow and 18 blowout occurrences\* in 1986 is presented in 4.3. Specific information to identify the well and the operations being conducted at the time of the occurrence, along with a brief description of the event, control procedures, cause, losses, injuries, and actions to prevent future occurrences, is provided. In some cases the exact cause and events leading to the occurrence are not fully known and have been postulated.

An abbreviated 10-year historical summary of blow and blowout occurrences is presented in 4.4.

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\* Also included is a summary of the well that encountered a severe abnormal pressure

The definitions of terms used in the drilling occurrence summaries in this report are:

- 1 Lost Circulation The loss of drilling fluids from the wellbore into permeable formations penetrated by the well.
- 2 Kick Any entry of water, gas, oil, or other formation fluid into the wellbore. It occurs because the pressure exerted by the column of drilling fluid is not great enough to overcome the pressure exerted by the formation fluids.
- 3 Water Flow An influx of water into the wellbore from a formation penetrated while drilling that may present problems in maintaining hole integrity.
- 4 Blow A flow of fluids (gas, oil, water, mud, etc) to the atmosphere from a well, which can be or is brought under control in a very short time-frame by closing appropriate equipment (control regained almost immediately).
- 5 Blowout A complete loss of control of a flow of fluids from a well. Control can only be regained by the installing of equipment to shut in or kill the well, or by drilling a relief well.
- 6 Duration Elapsed time from start of blow or blowout to regaining full control of the well.
- 7 Operations at time of blow or blowout
  - Drilling Original operation to drill a well or subsequent deepening of a well.
  - Servicing Non-routine servicing operations at a well involving completion, stimulation, special testing, recompletion, or changing downhole equipment (often called workovers).
  - Other Routine production/injection and maintenance operations, third-party damage, suspended or standing well.

## 4.1 Drilling Occurrences - Drilling Operations Only

## 4.1.1 Drilling Occurrences - 1986

Depth	Kicks	Blows	Blowouts
0 - 750	63	0	2
751 - 1 800	97	2	0
1 801 - 3 600	66	0	0
3 601 - 6 000	4	0	0
6 000.1 +	0	0	0
Total	230	2	2

## 4.1.2 Historical Drilling Occurrences (including water flows) - 1986 to 1978

Kicks

Depth (metres)	1986	1985	1984	1983	1982	1981	1980	1979	1978
0 - 750	63	98	69	58	67	113	117	78	101
751 - 1 800	97	154	116	94	58	89	118	88	64
1 801 - 3 600	66	94	92	69	44	72	88	83	59
3 601 - 6 000	4	8	4	2	3	15	23	20	13
Total	230	354	281	223	172	289	346	269	237

Blows

Depth (metres)	1986	1985	1984	1983	1982	1981	1980	1979	1978
0 - 750	0	0	0	1	1	4	2	2	1
751 - 1 800	2	2	0	2	3	3	4	5	3
1 801 - 3 600	0	0	0	1	2	3	2	2	0
3 601 - 6 000	0	0	0	0	1	1	0	0	0
Total	2	2	0	4	7	11	8	9	4

Blowouts

Depth (metres)	1986	1985	1984	1983	1982	1981	1980	1979	1978
0 - 750	2	1	0	0	2	1	2	1	0
751 - 1 800	0	0	2	1	0	1	0	0	0
1 801 - 3 600	0	0	2	0	2	0	0	1	0
3 601 - 6 000	0	0	0	0	0	0	0	0	0
Total	2	1	4	1	4	2	2	2	0

Lost Circulation

Depth (metres)	1986	1985	1984	1983	1982	1981	1980	1979	1978
0 - 750	856	1316	950	681	894	1060	1258	970	873
751 - 1 800	406	484	407	341	266	355	335	265	139
1 801 - 3 600	132	159	124	95	84	163	212	123	57
3 601 - 6 000	7	7	0	2	3	6	9	8	9
Total	1401	1966	1481	1119	1247	1584	1814	1366	1078

Water Flows

Depth (metres)	1986	1985	1984	1983	1982	1981	1980	1979	1978
0 - 100	12	8	11	5	7	10	33	5	2
101 - 200	8	1	7	3	5	9	7	1	4
201 - 300	5	8	1	2	1	3	6	0	1
301 - 400	2	2	0	2	1	2	2	0	1
401 - 750	0	6	3	2	5	4	10	2	2
751 - 1 800	1	6	1	14	5	4	11	4	4
1 801 - 3 600	0	4	0	13	1	0	12	0	1
3 601 - 6 000	0	0	0	0	0	0	0	0	2
Total	28	35	23	41	25	32	81	12	17

#### 4.1.3 Drilling Occurrence Analysis-Drilling Operations 1986 to 1975

Depth of Occurrence	Cum Wells	Occurrences	Type	Occurrences Per 1000 Wells Drilled								
				Kicks	Blows	Blow-Outs	Lost Circ	Water Flows	Total Occur	Kicks	Blows	Blow-Outs
0-500	71582	434	9	5	5467	190	9108	6.1	0.13	0.12	118.12	2.65
501-1000	59635	709	17	7	2312	45	3090	11.9	0.29	0.12	38.77	0.75
1001-1500	30399	266	12	1	1212	13	1504	8.75	0.39	0.30	39.87	0.43
1501-2000	18107	351	7	3	1093	14	1468	19.38	0.39	0.17	60.63	0.77
2001-2500	8582	197	1	2	396	12	608	22.38	0.12	0.23	46.14	1.40
2501-3000	4029	189	8	2	267	7	473	46.91	1.99	0.50	66.30	1.74
3001-3500	1633	109	2	3	175	3	292	66.75	1.22	1.84	107.16	1.84
3501-4000	702	42	0	0	42	1	85	59.83	0	0	59.83	1.42
4001-4500	355	39	1	0	14	1	55	109.86	2.82	0	39.44	2.82
4501-5000	171	21	0	0	15	0	36	122.81	0	0	87.72	0
- 5000	53	9	1	0	2	0	12	169.51	18.86	0	37.74	0
<b>Totals</b>	<b>71582</b>	<b>2366</b>	<b>58</b>	<b>26</b>	<b>13995</b>	<b>286</b>	<b>6731</b>	<b>33.05</b>	<b>0.8</b>	<b>0.36</b>	<b>195.51</b>	<b>4</b>

#### 4.2 Blow and Blowout Occurrences

In 1986, all available information on the ERCB files on blows and blowouts was reviewed in an effort to achieve a more consistent statistical summary. However, much of the older data lacks specific details. It would also appear that because of the greatly increased interest in blows/blowouts, minor blows and blowouts are now being reported that would not have been reported in the past. Therefore, caution should be exercised when comparing the 1986 to 1984 data to previous years.

There were 8 blows and 18 blowouts among the drilling occurrences in 1986 which include information on drilling, servicing, and other operations. Two blowouts occurred while drilling a well; 4 occurred during servicing operations. The remaining 12 occurred during various other operations. There were 8 blows distributed - 2 to drilling, 3 to servicing, and 3 to other operations.

Comparing the 26 blow/blowout events to total well activity - only 4 events occurred in drilling some 4495 wells, while 22 events occurred in operations involving some 79 000 active wells associated with hydrocarbon energy resource activity. Of the 22 events, 7 occurred during well servicing operations while 15 were attributed to other operations. Most of the latter were relatively minor events. Many were leaks at wellheads which by definition are small blows/blowouts. Rarely do such leaks become serious occurrences. A large number of the occurrences involved steam injection/crude bitumen production wells. Part of the reason for the continued blow/blowout occurrences in 1986 at oil sands wells is attributed to the large increase in steam-assisted crude bitumen recovery operations in recent years.

Sour fluid releases occurred in 3 blows and in 2 blowouts. All these releases involved small volumes of sour fluids, and 2 of those were a result of equipment failure. The other 3 were as a result of servicing operations. All of these occurrences were controlled in 12 hours or less.

## 4.2.1 Blow and Blowout Occurrences - 1986

<u>Operation</u>	<u>Blows</u>	<u>Blowouts</u>
Drilling	2	2
Servicing	3	4
Other	<u>3</u>	<u>12</u>
Total	<u>8</u>	<u>18</u>

## 4.2.2 Causes of Blows/Blowouts - 1986

<u>Occurrence</u>	<u>Operation and Cause</u>
Blows - 8	Drilling - 2 o Procedure shortcoming - 2  Servicing - 3 o Equipment failure - 3  Other - 3 o Equipment failure - 2 o Third-party damage - 1
Blowouts - 18	Drilling - 2 o Abnormally high pressured shallow zone - 2  Servicing - 4 o Equipment failure - 1 o Procedure shortcoming - 2 o Not determined - 1#
	Other - 12 o Equipment failure and/or procedure shortcoming - 10 o Third-party damage - 2
Total - 26	

# The Lac Mineral blowout is still under investigation

## 4.2.3 Causes of Blows/Blowouts with Sour Fluid Releases - 1986

<u>Occurrence</u>	<u>Operation</u>
Blows - 3	Drilling - 0
	Servicing - 1
	o Equipment failure - 1
	Other - 2
	o Equipment failure - 2
Blowout - 2	Drilling - 0
	Servicing - 0
	Other - 2
	o Equipment failure - 2
Total - 5	

4.2.4 Blow and Blowout Occurrences (Historical Statistics)  
1986 to 1977

	Blows		Blowouts		
	<u>Drilling</u>	<u>Servicing &amp; Other</u>	<u>Drilling</u>	<u>Servicing</u>	<u>Other</u>
1986	2	6	2	4	12
1985	2	5	1	6	15
1984	0	3	4	4	7
1983	4	4*	1	3	9
1982	6	8	4	4	8
1981	11	3	2	3	8
1980	9	6	2	5	3
1979	9	2	2	5	5
1978	4	4	0	3	8
1977	4	1	6	3	4
Total	51	42	24	40	79

\* Prior to 1984 many service and other blows are not recorded.

#### 4.3 BLOW/BLOWOUT SUMMARIES OF EACH OCCURRENCE - 1986

A summary of each of the 26 blow/blowout occurrences for 1986 is presented in the following tabulations. The definitions regarding the type of occurrences and the operations at the time of the occurrences are provided in the earlier discussion of Section 4.

BLOW/BLOWOUT SUMMARY

---

WELL NAME: ROYALITE FINA SADDLE HILLS 6-3-76-8LOCATION 00/06-03-076-08 W6/0 LICENCE NO.: 0010039

## OCCURRENCE

 BLOW;  BLOWOUT DATE: 06 January 1986 DURATION: 2.5 days

## OPERATION AT THE TIME OF OCCURRENCE

 DRILLING;  SERVICING;  OTHERLICENSEE: Gulf Canada Resources Inc.

CONTRACTOR: \_\_\_\_\_

FORMATION: Cadotte B DEPTH: 1464 mFORMATION PRESSURE: \_\_\_\_\_ kPa or DRILLING FLUID DENSITY: \_\_\_\_\_ kg/m<sup>3</sup>STATUS OF WELL AT TIME OF OCCURRENCE: Capped gas well

DESCRIPTION OF EVENT: A bull plug on the casing bowl was cracked allowing the well to flow.

CONTROL PROCEDURES: Replaced damaged bull plug with a valve, tied kill line into valve and pumped kill fluid to control well.

CAUSE OF BLOW/BLOWOUT: Equipment failure due to casing bowl being at ground level; it appears a frost or ice heave damaged the bull plug.

ACTIONS TO PREVENT FUTURE OCCURRENCES: Excavate immediate area around low profile wellheads.

HYDROCARBON AND/OR EQUIPMENT LOSS: Small volume of sweet gas. One bull plug.

INJURIES: None

---

BLOW/BLOWOUT SUMMARY

---

WELL NAME: PCP LINDBERGH EX 1A-7-55-5LOCATION 00/01-07-055-05 W4/0 LICENCE NO.: 0092976

## OCCURRENCE

X BLOW;    BLOWOUT DATE: 11 January 1986 DURATION: 10 minutes

## OPERATION AT THE TIME OF OCCURRENCE

   DRILLING; X SERVICING;    OTHER

---

LICENSEE: PanCanadian Petroleum Ltd.CONTRACTOR: N. L. McCulloughFORMATION: Wabiskaw-McMurray B DEPTH: 582 mFORMATION PRESSURE:    kPa or DRILLING FLUID DENSITY:    kg/m<sup>3</sup>STATUS OF WELL AT TIME OF OCCURRENCE: Steam cycle/crude bitumen-pumping

DESCRIPTION OF EVENT: While running a temperature wireline log the wireline pack-off on the wellhead failed, allowing the well to flow uncontrolled (mostly steam).

CONTROL PROCEDURES: The temperature tool was pulled out of the hole and the master valve closed shutting the well in.

CAUSE OF BLOW/BLOWOUT: Equipment Failure

ACTIONS TO PREVENT FUTURE OCCURRENCES: Better maintenance checks of equipment. PCP is going to use hydraulic pack-offs instead of the grease type that had been installed on this well.

HYDROCARBON AND/OR EQUIPMENT LOSS: 2m<sup>3</sup> of oil water mix. One pack-off.

INJURIES: None

## BLOW/BLOWOUT SUMMARY

WELL NAME: DOME ET AL 5A2 LINDBERGH 5-10-56-6

LOCATION 02/05-10-056-06 W4/0 LICENCE NO.: 0120832

## OCCURRENCE

BLOW;  BLOWOUT DATE: 14 January 1986 DURATION: 9 hours

#### OPERATION AT THE TIME OF OCCURRENCE

X DRILLING; SERVICING; OTHER

LICENSEE: Dome Petroleum Limited

CONTRACTOR: North Eastern Drilling Ltd. Rig #1

FORMATION: Wabiskaw-McMurray B DEPTH: 640 m

FORMATION PRESSURE: kPa or DRILLING FLUID DENSITY: 1,100 kg/m<sup>3</sup>

STATUS OF WELL AT TIME OF OCCURRENCE: Drilling crude bitumen

DESCRIPTION OF EVENT: A decrease in pump pressure combined with no returns caused a reduction in the hydrostatic pressure, thus allowing the Viking formation to invade the wellbore and blow the remaining mud out of the wellbore.

CONTROL PROCEDURES: The HCR valve was opened and the annular preventor was closed allowing the gas flow to be directed to the pit. Gas broke out under the conductor casing and came up around the lease. A second diverter line was installed and lost circulation material was mixed and pumped to regain control of the well.

CAUSE OF BLOW/BLOWOUT: Unexpected lost circulation zone, possibly caused by another producing well on same location.

ACTIONS TO PREVENT FUTURE OCCURRENCES: Establish bottom hole targets to minimize interference from other producing wells. Shut in existing producing wells if warranted.

HYDROCARBON AND/OR EQUIPMENT LOSS: 20  $10^3 \text{m}^3$  sweet gas. No equipment.

INJURIES: None

---

BLOW/BLOWOUT SUMMARY

---

WELL NAME: TCRL ET AL RIBSTONE 14B-18-43-4LOCATION 00/14-18-43-4 W4/0 LICENCE NO.: 0121156

## OCCURRENCE

X BLOW;        BLOWOUT DATE: 15 January 1986 DURATION: 1.0 hour

## OPERATION AT THE TIME OF OCCURRENCE

X DRILLING;        SERVICING;        OTHER

---

LICENSEE: Trans-Canada Resources Ltd.CONTRACTOR: Custom Drilling Rig #96FORMATION: Mannville DEPTH: 756 mFORMATION PRESSURE:                    kPa or DRILLING FLUID DENSITY:                    kg/m<sup>3</sup>STATUS OF WELL AT TIME OF OCCURRENCE: Lost circulation, stuck in the hole.

DESCRIPTION OF EVENT: After perforating the drill pipe at 351m, mud and gas flowed from the drill pipe.

CONTROL PROCEDURES: The stabbing valve and kelly were installed and fluid pumped to control the well.

CAUSE OF BLOW/BLOWOUT: Unexpected gas after perforating. Incorrect procedure, stabbing valve and lubricator should have been installed while perforating drill pipe.

ACTIONS TO PREVENT FUTURE OCCURRENCES: Implement better procedures for perforating.

HYDROCARBON AND/OR EQUIPMENT LOSS: Very small volume sweet gas.

INJURIES: None

BLOW/BLOWOUT SUMMARYWELL NAME: OAK ET AL ENCHANT 14-27-13-15LOCATION 00/14-27-013-15 W4/0 LICENCE NO.: 0122146

## OCCURRENCE

X BLOW;        BLOWOUT DATE: 14 March 1986 DURATION: 1.5 days

## OPERATION AT THE TIME OF OCCURRENCE

X DRILLING;        SERVICING;        OTHERLICENSEE: Oakwood Petroleum Ltd.CONTRACTOR: Bodor Drilling Rig #2FORMATION: Mannville DEPTH: 874 mFORMATION PRESSURE:                    kPa or DRILLING FLUID DENSITY:                    kg/m<sup>3</sup>STATUS OF WELL AT TIME OF OCCURRENCE: Tripping

DESCRIPTION OF EVENT: While out of the hole for a bit change the well was observed to be flowing. (The flow was suspected to originate from the Milk River formation). The blind rams were closed and the flow directed to the flare pit.

CONTROL PROCEDURES: Snubbed drill pipe back into the well and pumped kill fluid to control the flow.

CAUSE OF BLOW/BLOWOUT: Swabbed well when tripping out for bit change.

ACTIONS TO PREVENT FUTURE OCCURRENCES: Implement better tripping procedures.

HYDROCARBON AND/OR EQUIPMENT LOSS: 84 10<sup>3</sup>m<sup>3</sup> sweet gas, 95m<sup>3</sup> formation water. No equipment.

INJURIES: None

---

BLOW/BLOWOUT SUMMARY

---

WELL NAME: ESSO 84 H2-7 COLD LK 15-21-65-4LOCATION 05/15-21-065-04 W4M LICENCE NO.: 0108826

## OCCURRENCE

BLOW;  BLOWOUT DATE: 12 April 1986 DURATION: 1.25 days

## OPERATION AT THE TIME OF OCCURRENCE

DRILLING; SERVICING;  OTHER

---

LICENSEE: Esso Resources Canada Ltd.

CONTRACTOR:

FORMATION: Clearwater A DEPTH: 452 mFORMATION PRESSURE: 4853 kPa or DRILLING FLUID DENSITY: kg/m<sup>3</sup>STATUS OF WELL AT TIME OF OCCURRENCE: Flowing back after steam cycle/crude bitumen

DESCRIPTION OF EVENT: During the production cycle, communication with a steaming well caused high flow rates. Sand produced with the well fluids eroded the choke and associated wellhead flowline causing the blowout.

CONTROL PROCEDURES: A kill line was tied into the casing valve and fluid was pumped down the tubing casing annulus to kill the well.

CAUSE OF BLOW/BLOWOUT: Equipment failure caused by sand erosion.

ACTIONS TO PREVENT FUTURE OCCURRENCES: Better monitoring of wellhead components, testing early warning devices such as sand probes, more control of well flow rates.

HYDROCARBON AND/OR EQUIPMENT LOSS: 60m<sup>3</sup> mixture of oil, sand and water. One wellhead plus components.

INJURIES: None

BLOW/BLOWOUT SUMMARY

---

WELL NAME: BANFF GUYER BASHAW 10-6MU-42-22LOCATION 00/10-06-042-22 W4/0 LICENCE NO.: 0025012

## OCCURRENCE

X BLOW;    BLOWOUT DATE: 12 April 1986 DURATION: 8 hours

## OPERATION AT THE TIME OF OCCURRENCE

   DRILLING;    SERVICING; X OTHER

---

LICENSEE: Gulf Canada Ltd.

CONTRACTOR:

FORMATION: D3-A DEPTH: 1759 mFORMATION PRESSURE:    kPa or DRILLING FLUID DENSITY:    kg/m<sup>3</sup>STATUS OF WELL AT TIME OF OCCURRENCE: Crude oil pumping

DESCRIPTION OF EVENT: The polish rod broke allowing the well to flow uncontrolled.

CONTROL PROCEDURES: Shut well master valve and ball valve on wellhead flowline stopping the flow.

CAUSE OF BLOW/BLOWOUT: Equipment failure, polish rod.

ACTIONS TO PREVENT FUTURE OCCURRENCES: Scheduled maintenance checks.

HYDROCARBON AND/OR EQUIPMENT LOSS: 2m<sup>3</sup> oil, 2m<sup>3</sup> salt water, very small volume of sour gas (12% H<sub>2</sub>S).

INJURIES: None

## BLOW/BLOWOUT SUMMARY

WELL NAME: AMOCO BRAZEAU RIVER 10-9-45-12

LOCATION 00/10-09-045-12 W5/0 LICENCE NO.: 0114339

## OCCLURENCE

BLOW; X BLOWOUT DATE: 25 April 1986 DURATION: 7 hours

**OPERATION AT THE TIME OF OCCURRENCE**

DRILLING;  X SERVICING;  OTHER

LICENSEE: Amoco Canada Petroleum Company Ltd.

**CONTRACTOR:**

FORMATION: Nisku DEPTH: 3416 m

FORMATION PRESSURE: \_\_\_\_\_ kPa or DRILLING FLUID DENSITY: \_\_\_\_\_ kg/m<sup>3</sup>

STATUS OF WELL AT TIME OF OCCURRENCE: Capped gas well

DESCRIPTION OF EVENT: While pulling out of hole with wireline, tools became stuck in wellhead and pulled out of rope socket. Unable to close master valves as the sinker bars were across the valves. Subsequently, the well began spraying a fine mist through the lubricator pack-off head.

CONTROL PROCEDURES: Pumped 15.3<sup>3</sup> CACL<sub>2</sub> (1200kg/m<sup>3</sup>) down tubing to kill the well. The sinker bars fell into the wellbore allowing the wellhead master valves to be closed.

CAUSE OF BLOW/BLOWOUT: Equipment failure.

ACTIONS TO PREVENT FUTURE OCCURRENCES: Regularly scheduled maintenance checks on all wireline and associated equipment.

HYDROCARBON AND/OR EQUIPMENT LOSS: Very small volume of gas (6.7% H<sub>2</sub>S).

INJURIES: None

BLOW/BLOWOUT SUMMARYWELL NAME: MOBIL PR CARSON 6-12MU-62-12LOCATION 00/06-12-062-12 W5/0 LICENCE NO.: 0021816

## OCCURRENCE

 BLOW;  BLOWOUT DATE: 13 May 1986 DURATION: 12 hours

## OPERATION AT THE TIME OF OCCURRENCE

 DRILLING;  SERVICING;  OTHERLICENSEE: Mobil Oil Canada Ltd.

CONTRACTOR: \_\_\_\_\_

FORMATION: Beaverhill Lake DEPTH: 2635.3 mFORMATION PRESSURE: \_\_\_\_\_ kPa or DRILLING FLUID DENSITY: 1175 kg/m<sup>3</sup>STATUS OF WELL AT TIME OF OCCURRENCE: Suspended oil well

DESCRIPTION OF EVENT: The production casing failed due to corrosion allowing the well to flow up the surface casing, flowing through the surface casing vent.

CONTROL PROCEDURES: A pump was tied into the tubing and kill fluid pumped to fill the annulus and control the flow.

CAUSE OF BLOW/BLOWOUT: Equipment failure.

ACTIONS TO PREVENT FUTURE OCCURRENCES: Continued and increased corrosion monitoring and protection of casing.

HYDROCARBON AND/OR EQUIPMENT LOSS: 5m<sup>3</sup> oil, 139m<sup>3</sup> produced water. No equipment.

INJURIES: None

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BLOW/BLOWOUT SUMMARY

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WELL NAME: BUMPER ET AL ROSE CREEK 16-20-44-6

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LOCATION 00/16-20-044-06 W5/0 LICENCE NO.: 0106957

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## OCCURRENCE

X BLOW;    BLOWOUT DATE: 24 May 1986 DURATION: 30 minutes

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## OPERATION AT THE TIME OF OCCURRENCE

   DRILLING; X SERVICING;    OTHER

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LICENSEE: Bumper Development Corp. Ltd.

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CONTRACTOR: Wes Can Well Servicing Rig #1

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FORMATION: Lower Mannville Undefined DEPTH: 2240.5 m

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FORMATION PRESSURE:            kPa or DRILLING FLUID DENSITY:            kg/m<sup>3</sup>

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STATUS OF WELL AT TIME OF OCCURRENCE: Capped gas well

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DESCRIPTION OF EVENT: While preparing to run a permanent packer, the pressure was equalized across the wellhead and the blind rams were opened. As the wireline tools were being lowered into the well, the lubricator was blown off the BOP stack allowing the well to flow through the wireline flange.

CONTROL PROCEDURES: The blind rams were shut but did not make a complete seal. The annular preventor was then closed which stopped the flow. The lubricator flange was removed. A valve was then installed and the well shut in.

CAUSE OF BLOW/BLOWOUT: Equipment failure

ACTIONS TO PREVENT FUTURE OCCURRENCES: Ensure pressure is bleed off and all personnel are off the floor before attempting to run tools into the well.

HYDROCARBON AND/OR EQUIPMENT LOSS: Very small volume of sweet gas, packer, lubricator and setting tool.

INJURIES: 1 injured

#### BLOW/BLOWOUT SUMMARY

WELL NAME: HB ET AL JACKFISH A11-36-59-21 W5M

LOCATION 02/11-36-059-21 W5/0 LICENCE NO.: 0049433

## OCCURRENCE

X BLOW; BLOWOUT DATE: 30 May 1986 DURATION: 5 minutes

#### OPERATION AT THE TIME OF OCCURRENCE

Production logging operations were in progress

LICENSEE: Amoco Canada Petroleum Company Ltd.

CONTRACTOR: Dresser Atlas

FORMATION: D-3A DEPTH: m

FORMATION PRESSURE: kPa or DRILLING FLUID DENSITY: kg/m<sup>3</sup>

STATUS OF WELL AT TIME OF OCCURRENCE: Flowing (sour) gas well

DESCRIPTION OF EVENT: While pulling the logging tool with the BOP closed and a lubricator and equalizer valve installed. The equalizer valve failed with the tools at a depth of 8m allowing an uncontrolled release.

CONTROL PROCEDURES: The tools were immediately retrieved and the well shut in bringing the gas flow under control.

CAUSE OF BLOW/BLOWOUT: Equipment failure. The wireline lubricator equalizer valve failed due to sulphide stress corrosion cracking.

ACTIONS TO PREVENT FUTURE OCCURRENCES: Scheduled maintenance checks.

HYDROCARBON AND/OR EQUIPMENT LOSS: 0.08  $10^3 \text{ m}^3$  (18.6% H<sub>2</sub>S) of gas, one valve.

**INJURIES:** None

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BLOW/BLOWOUT SUMMARY

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WELL NAME: SUNCOR-WECO FORT KENT EX 7-28-61-4LOCATION AJ/07-28-061-04 W4/0 LICENCE NO.: 0074894

## OCCURRENCE

BLOW;  BLOWOUT DATE: 5 June 1986 DURATION: 35 minutes

## OPERATION AT THE TIME OF OCCURRENCE

DRILLING;  SERVICING;  OTHER

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LICENSEE: Suncor Inc.

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CONTRACTOR: Citation Well Service Rig #12FORMATION: Cold Lake DEPTH: 366.6 mFORMATION PRESSURE: \_\_\_\_\_ kPa or DRILLING FLUID DENSITY: \_\_\_\_\_ kg/m<sup>3</sup>STATUS OF WELL AT TIME OF OCCURRENCE: Crude bitumen pumping well

DESCRIPTION OF EVENT: After pulling the pump, the wellhead was removed to install the BOP stack. The well blew in from the casing before the BOP's could be installed.

CONTROL PROCEDURES: Lowered BOP stack onto the well closed rams and pumped kill fluid to control well.

CAUSE OF BLOW/BLOWOUT: Procedure shortcoming. Well was not completely secured prior to removing wellhead.

ACTIONS TO PREVENT FUTURE OCCURRENCES: Ensure well is secure prior to removing wellhead.

HYDROCARBON AND/OR EQUIPMENT LOSS: 11m<sup>3</sup> of oil and water.

INJURIES: None

## BLOW/BLOWOUT SUMMARY

WELL NAME: PEX WHITECOURT 10-18-60-11LOCATION 10-18-060-11 W5/0 LICENCE NO.: 0050921

## OCCURRENCE

 BLOW;  BLOWOUT DATE: 27 June 1986 DURATION: \_\_\_\_\_

## OPERATION AT THE TIME OF OCCURRENCE

 DRILLING;  SERVICING;  OTHERLICENSEE: Petro Canada Inc.

CONTRACTOR: \_\_\_\_\_

FORMATION: Jurassic D DEPTH: 1680 mFORMATION PRESSURE: \_\_\_\_\_ kPa or DRILLING FLUID DENSITY: \_\_\_\_\_ kg/m<sup>3</sup>STATUS OF WELL AT TIME OF OCCURRENCE: Producing gas well

DESCRIPTION OF EVENT: Three leaks caused by internal corrosion on the production casing allowed gas to flow to surface through the surface casing vent.

CONTROL PROCEDURES: The surface casing vent valve was closed stopping the flow. A cement squeeze was conducted on the well eliminating the leak.

CAUSE OF BLOW/BLOWOUT: Equipment failure (corrosion).

ACTIONS TO PREVENT FUTURE OCCURRENCES: Better corrosion monitoring and protection of casing strings.

HYDROCARBON AND/OR EQUIPMENT LOSS: Very small volume of sweet gas.

INJURIES: None

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BLOW/BLOWOUT SUMMARY

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WELL NAME: HUSKY CWWE EOR BEAVDM EX 14C-27-60-3LOCATION AA/14-27-060-03 W4/0 LICENCE NO.: 0118929

## OCCURRENCE

 BLOW;  BLOWOUT DATE: 02 August 1986 DURATION: 6 hours

## OPERATION AT THE TIME OF OCCURRENCE

 DRILLING;  SERVICING;  OTHER

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LICENSEE: Husky Oil Operations Ltd.

CONTRACTOR: \_\_\_\_\_

FORMATION: Grand Rapids DEPTH: 406 mFORMATION PRESSURE: 3200 (EST) kPa or DRILLING FLUID DENSITY: kg/m<sup>3</sup>STATUS OF WELL AT TIME OF OCCURRENCE: Flow back after crude bitumen steam cycle

DESCRIPTION OF EVENT: During the flow back, sand produced with the well fluids washed out a nipple, flowtee and flange on the wellhead allowing the uncontrolled flow.

CONTROL PROCEDURES: A line was tied into the casing valve and kill fluid pumped to control the well.

CAUSE OF BLOW/BLOWOUT: Equipment failure caused by sand erosion.

ACTIONS TO PREVENT FUTURE OCCURRENCES: Better monitoring/control of sand production.

HYDROCARBON AND/OR EQUIPMENT LOSS: 1m<sup>3</sup> crude oil, one nipple flowtee and flange.

INJURIES: None

BLOW/BLOWOUT SUMMARY

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WELL NAME: DOME ET AL LARNE 10-1-117-4LOCATION 00/10-01-117-04 W6/0 LICENCE NO.: 0123245

## OCCURRENCE

 BLOW;  BLOWOUT DATE: 06 August 1986 DURATION: 2 days

## OPERATION AT THE TIME OF OCCURRENCE

 DRILLING;  SERVICING;  OTHERLICENSEE: Dome Petroleum Ltd.

CONTRACTOR: \_\_\_\_\_

FORMATION: Slave Point/Sulphur Point DEPTH: 1439/1307 mFORMATION PRESSURE: \_\_\_\_\_ kPa or DRILLING FLUID DENSITY: \_\_\_\_\_ kg/m<sup>3</sup>STATUS OF WELL AT TIME OF OCCURRENCE: Standing oil well

DESCRIPTION OF EVENT: Lost circulation was encountered when cementing the production casing. The production casing was set in slips in the surface casing bowl and the rig released. Later, gas pressure exceeded the hydrostatic pressure in the annulus and the well blew out through the surface casing valves. The production casing was out of the slips and had dropped approximately 1 - 2 m below the surface.

CONTROL PROCEDURES: Blind rams were installed on the casing bowl and closed. The flow was then directed through a test separator to obtain a flow rate. The well was then killed by pumping KCL water down the annulus. After the well was brought under control, the production casing was speared and relanded in the slips. Attempts were made to reach TD inside the production casing however, after numerous unsuccessful attempts and losing one fish in the hole, Dome decided to abandon the well. It would appear that the production casing was corkscrewed when it dropped in the surface casing.

CAUSE OF BLOW/BLOWOUT: The poor cement job caused by lost circulation problems was not properly evaluated prior to rig release. Lack of cement permitted gas to flow up the annulus to surface.

ACTIONS TO PREVENT FUTURE OCCURRENCES: Improve cementing procedures. Upon completion of drilling a well, the well must be adequately secured prior to releasing the rig.

HYDROCARBON AND/OR EQUIPMENT LOSS: 112 10<sup>3</sup>m<sup>3</sup> sweet gas. Well was abandoned.

INJURIES: None

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BLOW/BLOWOUT SUMMARY

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WELL NAME: PEX UNIT 1 KINSELLA 8B-24-48-9LOCATION BO/08-24-048-09 W4/0 LICENCE NO.: 054793

OCCURRENCE

BLOW;  BLOWOUT DATE: 12 August 1986 DURATION: 2 days

## OPERATION AT THE TIME OF OCCURRENCE

DRILLING;  SERVICING;  OTHER

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LICENSEE: Petro Canada Inc.

CONTRACTOR: \_\_\_\_\_

FORMATION: Wainwright B DEPTH: 677.6 mFORMATION PRESSURE: \_\_\_\_\_ kPa or DRILLING FLUID DENSITY: \_\_\_\_\_ kg/m<sup>3</sup>STATUS OF WELL AT TIME OF OCCURRENCE: Producing oil well/oxygen flood

DESCRIPTION OF EVENT: While blowing down the production casing, an apparent explosion occurred in the wellbore damaging the casing, allowing the well to flow to surface from holes in the casing.

CONTROL PROCEDURES: Eleven water injection wells surrounding the area were shut in, also kill fluid was pumped down the tubing and casing at different times.

CAUSE OF BLOW/BLOWOUT: Equipment failure.

ACTIONS TO PREVENT FUTURE OCCURRENCES: Check lower explosive limit of the well effluent prior to blow down and adjust venting procedures to ensure that gas velocities in the wellbores are limited to safe levels.

HYDROCARBON AND/OR EQUIPMENT LOSS: Small amount of sweet gas and water.

INJURIES: None

BLOW/BLOWOUT SUMMARYWELL NAME: COX TREND AMOCO CARSONW 14-12-62-13LOCATION 00/14-12-062-13 W5/0 LICENCE NO.: 0047332

## OCCURRENCE

BLOW;  BLOWOUT DATE: 21 August 1986 DURATION: 12 hours

## OPERATION AT THE TIME OF OCCURRENCE

DRILLING;  SERVICING;  OTHERLICENSEE: Mobil Oil Canada Ltd.

CONTRACTOR: \_\_\_\_\_

FORMATION: Beaverhill Lake B DEPTH: 2773 mFORMATION PRESSURE: \_\_\_\_\_ kPa or DRILLING FLUID DENSITY: \_\_\_\_\_ kg/m<sup>3</sup>STATUS OF WELL AT TIME OF OCCURRENCE: Producing oil well

DESCRIPTION OF EVENT: The stuffing box had been leaking, the ratigan was closed to repair the stuffing box. The ratigan failed allowing the well to flow uncontrolled.

CONTROL PROCEDURES: A line was tied into the wellhead casing outlet and kill fluid pumped to control the well.

CAUSE OF BLOW/BLOWOUT: Equipment failure.

ACTIONS TO PREVENT FUTURE OCCURRENCES: Regularly scheduled maintenance checks of all wellhead equipment.

HYDROCARBON AND/OR EQUIPMENT LOSS: 16m<sup>3</sup> multiphase fluid, one stuffing box.

INJURIES: None

BLOW/BLOWOUT SUMMARY

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WELL NAME: ESSO 85 D22-2 COLD LK 7-11-65-4LOCATION 03/07-11-065-04 W4/0 LICENCE NO.: 0115043

## OCCURRENCE

 BLOW;  BLOWOUT DATE: 22 August 1986 DURATION: 3.75 days

## OPERATION AT THE TIME OF OCCURRENCE

 DRILLING;  SERVICING;  OTHER

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LICENSEE: Esso Resources Canada Ltd.

CONTRACTOR: \_\_\_\_\_

FORMATION: Clearwater A DEPTH: 564 mFORMATION PRESSURE: 6860 (EST) kPa or DRILLING FLUID DENSITY: kg/m<sup>3</sup>STATUS OF WELL AT TIME OF OCCURRENCE: Flowing back after steaming cycle/crude bitumen

DESCRIPTION OF EVENT: During the flow-back, unexpectedly high sand volumes erroded the choke and associated wellhead flowline causing the blowout.

CONTROL PROCEDURES: A BOP stack was installed on the wellhead and the well shut in.

CAUSE OF BLOW/BLOWOUT: Equipment failure caused by sand erosion.

ACTIONS TO PREVENT FUTURE OCCURRENCES: Better monitoring of wellhead components, testing early warning devices such as sand probes, more control on well flow rates.

HYDROCARBON AND/OR EQUIPMENT LOSS:  $400\text{m}^3$  fluid (70% hydrocarbon). One wellhead plus components.

INJURIES: None

BLOW/BLOWOUT SUMMARY

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WELL NAME: PROPHET ET AL PEMBINA 6-25-49-6LOCATION 02/06-25-049-06 W5/0 LICENCE NO.: 0121356

## OCCURRENCE

 BLOW;  BLOWOUT DATE: 28 August 1986 DURATION: 6.5 hours

## OPERATION AT THE TIME OF OCCURRENCE

 DRILLING;  SERVICING;  OTHERLICENSEE: Prophet Petroleum Ltd.

CONTRACTOR: \_\_\_\_\_

FORMATION: Jurassic N Pool DEPTH: 1809 mFORMATION PRESSURE: \_\_\_\_\_ kPa or DRILLING FLUID DENSITY: \_\_\_\_\_ kg/m<sup>3</sup>STATUS OF WELL AT TIME OF OCCURRENCE: Shut-in oilwell

DESCRIPTION OF EVENT: A flange between the flow T and stuffing box became loose allowing the well to flow uncontrolled.

CONTROL PROCEDURES: The ratigan was closed and the flow was directed to the production tank to reduce the pressure on the flange. A line was tied into the casing and kill fluid pumped to control the well.

CAUSE OF BLOW/BLOWOUT: Equipment failure. Improper installation of flange.

ACTIONS TO PREVENT FUTURE OCCURRENCES: Better equipment maintenance checks should be conducted.

HYDROCARBON AND/OR EQUIPMENT LOSS: 0.5m<sup>3</sup> oil, 1.0 10<sup>3</sup>m<sup>3</sup> gas (0.1% H<sub>2</sub>S). No equipment.

INJURIES: None

## BLOW/BLOWOUT SUMMARY

WELL NAME: LAC ET AL MINEHEAD 6-18-49-17LOCATION 00/06-18-049-17 W5/0 LICENCE NO.: 0121674

## OCCURRENCE

BLOW;  BLOWOUT DATE: 29 August 1986 DURATION: 5 days

## OPERATION AT THE TIME OF OCCURRENCE

DRILLING;  SERVICING;  OTHERLICENSEE: LAC Minerals Ltd.CONTRACTOR: Westwood Well Service (1977) Ltd. and Canadian HydraulicFORMATION: Cardium DEPTH: 2436 mFORMATION PRESSURE: \_\_\_\_\_ kPa or DRILLING FLUID DENSITY: \_\_\_\_\_ kg/m<sup>3</sup>STATUS OF WELL AT TIME OF OCCURRENCE: Capped Cardium gas well

DESCRIPTION OF EVENT: This is a preliminary summary of this blowout as investigations and actions resulting therefrom have not been completed. The gas well had been perforated and tested early in 1986. The test results indicated a relatively low flow capacity. The tubing conveyed perforating gun (TCP) had been left in the well. In August 1986, in preparation for a frac job to improve the well's flow capacity, the 60.3mm tubing with the TCP was to be changed out to 88.9 tubing. The tubing was to be changed out with snubbing equipment so the well would not have to be killed. Killing the well might damage the inflow capability of the well. The TCP was found stuck in the hole and the pulling capacity of the smaller tubing was insufficient to pull it free. This necessitated cutting off the tubing and snubbing it out of the hole. The larger tubing, with fishing equipment was snubbed in to retrieve the TCP. The tubing and fishing tools with the TCP were removed from the well but in doing so an explosion and fire occurred destroying the servicing equipment and injuring all of the crew members.

CONTROL PROCEDURES: All damaged equipment including the BOP stack, were removed from on, and around the well. The fire was then extinguished, a new tubing spool and BOP stack were installed. The top set of blind rams were closed and the well brought under control.

HYDROCARBON AND/OR EQUIPMENT LOSS: Service rig, snubbing unit and all related equipment, 56 10<sup>3</sup>m<sup>3</sup> of sweet gas, 12m<sup>3</sup> frac oil.

INJURIES: 2 deaths, 8 injuries

BLOW/BLOWOUT SUMMARY

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WELL NAME: DOME ET AL GORDONDALE 8-29-78-11 W6LOCATION 00/08-29-078-11 W6/0 LICENCE NO.: 0119798

## OCCURRENCE

X BLOW;    BLOWOUT DATE: 10 Sept. 1986 DURATION: 12 hours

## OPERATION AT THE TIME OF OCCURRENCE

   DRILLING;    SERVICING; X OTHER

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LICENSEE: Dome Petroleum Ltd.CONTRACTOR: 

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FORMATION: Halfway G DEPTH: 1878 mFORMATION PRESSURE:    kPa or DRILLING FLUID DENSITY:    kg/m<sup>3</sup>STATUS OF WELL AT TIME OF OCCURRENCE: Crude oil flowing

DESCRIPTION OF EVENT: Frac sand washed out the choke in the wellhead flowline allowing the oil and gas to blow to atmosphere.

CONTROL PROCEDURES: The wellhead master valves were shut in and the flow was shut off.

CAUSE OF BLOW/BLOWOUT: Equipment failure

ACTIONS TO PREVENT FUTURE OCCURRENCES: Regularly scheduled maintenance checks of all wellhead equipment.

HYDROCARBON AND/OR EQUIPMENT LOSS: 0.5m<sup>3</sup> oil and 10 10<sup>3</sup>m<sup>3</sup> sour gas (1.5% H<sub>2</sub>S). One wellhead choke.

INJURIES: None

### BLOW/BLOWOUT SUMMARY

WELL NAME: IMP UNIT CDN-SUP PEM INJ 6-25C-49-6

LOCATION 06-25-049-06 W5/0

LICENCE NO.: 0017910

## OCCURRENCE

X BLOW; BLOWOUT DATE: 21 Sept. 1986 DURATION: 1 hour

#### OPERATION AT THE TIME OF OCCURRENCE

DRILLING;                    SERVICING;    X    OTHER

LICENSEE: Esso Resources Canada Ltd.

CONTRACTOR: Able Oil and Gas Installation Ltd.

FORMATION: Cardium DEPTH: 1295 m

FORMATION PRESSURE: \_\_\_\_\_ kPa or DRILLING FLUID DENSITY: \_\_\_\_\_ kg/m<sup>3</sup>

STATUS OF WELL AT TIME OF OCCURRENCE: Water injection

DESCRIPTION OF EVENT: A lease worker backed his vehicle into the fibreglass wellhead shelter causing it to contact the piping on the wellhead. This caused a threaded nipple to crack allowing the salt water spray.

CONTROL PROCEDURES: The wellhead master valves were closed shutting the flow in.

CAUSE OF BLOW/BLOWOUT: (Carelessness)

ACTIONS TO PREVENT FUTURE OCCURRENCES: Strict control of traffic on lease. Protect and sign wellheads.

HYDROCARBON AND/OR EQUIPMENT LOSS: 3m<sup>3</sup> salt water. One threaded nipple.

INJURIES: None

## BLOW/BLOWOUT SUMMARY

WELL NAME: ANADARKO ET AL HAYS 10-29-13-15

LOCATION 00/10-29-013-15 W4/0 LICENCE NO.: 0061166

## OCCURRENCE

BLOW;  BLOWOUT DATE: 26 October 1986 DURATION: 4 hours

#### OPERATION AT THE TIME OF OCCURRENCE

DRILLING:                    SERVICING:    X    OTHER

LICENSEE: Anadarko Petroleum

CONTRACTOR:

FORMATION: Bow Island DEPTH: 813.80 m

FORMATION PRESSURE: kPa or DRILLING FLUID DENSITY: kg/m<sup>3</sup>

STATUS OF WELL AT TIME OF OCCURRENCE: Capped Bow Island gas well

DESCRIPTION OF EVENT: A farmer backed his tractor into the wellhead, snapping a 4 inch nipple and valve off the production casing bowl.

CONTROL PROCEDURES: The tubing master valve was opened to reduce the gas flow out of the casing bowl outlet. The broken nipple was removed and a bull plug installed into the outlet. The master valve was then closed and the well was again under control.

CAUSE OF BLOW/BLOWOUT: Third party damage.

ACTIONS TO PREVENT FUTURE OCCURRENCES: Ensure all wellheads are clearly marked.

HYDROCARBON AND/OR EQUIPMENT LOSS: 21 10<sup>3</sup>m<sup>3</sup> sweet gas, one 4 inch nipple and ball valve.

INJURIES: None

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BLOW/BLOWOUT SUMMARY

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WELL NAME: CDCOG TENN MUSKEG EX AJ 16-09LOCATION AJ/16-09-095-07 W4/0 LICENCE NO.: 0088058

## OCCURRENCE

BLOW;  BLOWOUT DATE: 18 November 1986 DURATION: 5 hours

## OPERATION AT THE TIME OF OCCURRENCE

DRILLING;  SERVICING;  OTHER

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LICENSEE: Canterra Energy Ltd.CONTRACTOR: Citation Well Service Ltd. Rig #12FORMATION: Wabiskaw-McMurray A DEPTH: 185 mFORMATION PRESSURE: \_\_\_\_\_ kPa or DRILLING FLUID DENSITY: \_\_\_\_\_ kg/m<sup>3</sup>STATUS OF WELL AT TIME OF OCCURRENCE: Pumping crude bitumen well

DESCRIPTION OF EVENT: Service rig was pulling tubing when a small kick of water followed by steam was taken. The pipe rams were then closed. One of the casing valves which had been left open was now closed, at this time it was noted that a circulation valve on the BOP spool had inadvertently been left off allowing the well to flow steam and water.

CONTROL PROCEDURES: A stabbing valve was installed into the tubing. Numerous attempts were made over a 5 hour period until finally a valve was successfully installed into the BOP spool and the well shut in.

CAUSE OF BLOW/BLOWOUT: Procedure shortcoming (human error).

ACTIONS TO PREVENT FUTURE OCCURRENCES: Better crew BOP training and more thorough inspections of BOP and related equipment.

HYDROCARBON AND/OR EQUIPMENT LOSS: 0.5m<sup>3</sup> oil, 2.0m<sup>3</sup> water. No equipment.

INJURIES: None

BLOW/BLOWOUT SUMMARYWELL NAME: WESTMIN BEAUVALLON 16-24-53-08LOCATION 00/16-24-053-08 W4/0 LICENCE NO.: 0095381

## OCCURRENCE

BLOW;  BLOWOUT DATE: 26 November 1986 DURATION: 20 hours

## OPERATION AT THE TIME OF OCCURRENCE

DRILLING;  SERVICING;  OTHERLICENSEE: Westmin Resources Ltd.

CONTRACTOR: \_\_\_\_\_

FORMATION: Viking DEPTH: 490 mFORMATION PRESSURE: 900 kPa or DRILLING FLUID DENSITY: kg/m<sup>3</sup>STATUS OF WELL AT TIME OF OCCURRENCE: Capped gas well

DESCRIPTION OF EVENT: While working around the wellhead, a farmer struck the well with his tractor, breaking the master valve of the wellhead allowing the well to flow uncontrolled.

CONTROL PROCEDURES: Installed a new master valve and shut the well in.

CAUSE OF BLOW/BLOWOUT: Third-party damage

ACTIONS TO PREVENT FUTURE OCCURRENCES: Ensure all wellheads are clearly marked.

HYDROCARBON AND/OR EQUIPMENT LOSS: Small volume of gas. One wellhead master valve.

INJURIES: None

## BLOW/BLOWOUT SUMMARY

WELL NAME: LOMALTA TABERS 2C-17-7-16

LOCATION 02/02-17-007-16 W4/00 LICENCE NO.: 0124216

## OCCURRENCE

SEVERE ABNORMAL PRESSURE ENCOUNTERED  
BLOW; BLOWOUT DATE: 28 Nov. 1986 DURATION: 17 days

#### OPERATION AT THE TIME OF OCCURRENCE

X DRILLING; SERVICING; OTHER

LICENSEE: Lomalta Resources Ltd.

CONTRACTOR: Cactus Drilling Rig #8

FORMATION: Mannville DEPTH: 995 m

FORMATION PRESSURE: \_\_\_\_\_ kPa or DRILLING FLUID DENSITY: \_\_\_\_\_ kg/m<sup>3</sup>

STATUS OF WELL AT TIME OF OCCURRENCE: Drilling potential oil well

DESCRIPTION OF EVENT: At 995 meters, the drilling was stopped and a flow check was conducted, indicating the well was flowing to surface. The well was shut-in, however, the maximum allowable casing pressure was surpassed. Flow was directed through degasser to flare.

CONTROL PROCEDURES: Mud weight was continually increased until it reached 2250kg/m<sup>3</sup>. This density did not stop the flow initially. Attempts to raise the density above 2260kg/m<sup>3</sup> caused the well bore to lose fluid. The adjacent pool was depressured by ceasing water injection and continuing production. This depressuring ultimately reduced the reservoir pressure sufficiently to permit the safe abandonment of the overpressured zone with a cement plug. The lower portion of the drill string was cemented in the hole due to the danger of loosing the capability to circulate the entire hole should the drill pipe become stuck in the dog leg when partially out of the hole. During the period of time that the pool was being depressured, a relief well was spudded.

CAUSE OF BLOW/BLOWOUT: Drilled into an abnormally high pressured formation. The abnormal pressure was caused by an adjacent water injection project.

ACTIONS TO PREVENT FUTURE OCCURRENCES: Better initial review and improved monitoring of reservoir pressures in pools under injection.

HYDROCARBON AND/OR EQUIPMENT LOSS: No hydrocarbon loss. The lower portion of the drill string was lost.

INJURIES: None

BLOW/BLOWOUT SUMMARY

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WELL NAME: ESSO 86 J12-3 COLD LK 9-15-65-4

LOCATION 03/09-15-065-04 W4/0

LICENCE NO.: 0124310

## OCCURRENCE

 BLOW;  BLOWOUT DATE: 13 December 1986 DURATION: 1 day

## OPERATION AT THE TIME OF OCCURRENCE

 DRILLING;  SERVICING;  OTHER

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LICENSEE: Esso Resources Canada Ltd.

CONTRACTOR: Sedco Drilling

FORMATION: Grand Rapids DEPTH: 465 m

FORMATION PRESSURE: kPa or DRILLING FLUID DENSITY: kg/m<sup>3</sup>

STATUS OF WELL AT TIME OF OCCURRENCE: Drilling

DESCRIPTION OF EVENT: While well was shut down for surveying, the well started flowing. The well was shut in and the flow of mud and gas diverted to the flare pit. The flare line plugged off and the rig pumps were shut down. The well then began to flow up the drill pipe and was noted to be flowing to surface through the conductor pipe on an adjacent well.

CONTROL PROCEDURES: Stabbing valve was installed in drill pipe and kill fluid was pumped into well to control the flow of gas and steam.

CAUSE OF BLOW/BLOWOUT: Unexpected abnormally pressured zone, caused by communication from adjacent wells on steam injection cycle.

ACTIONS TO PREVENT FUTURE OCCURRENCES: Ensure no wells are on steam injection and area sufficiently depressured while drilling new well.

HYDROCARBON AND/OR EQUIPMENT LOSS: Very small volume of sweet gas. No equipment.

INJURIES: None

#### 4.4 HISTORICAL SUMMARY - BLOW/BLOWOUT OCCURRENCES - 1986 to 1976

A brief summary of blow and blowout occurrences for the past 10 years appears in the following tabulation. The summary by well is in chronological order by year.

## BLOW AND BLOWOUT OCCURRENCES - 1986 - 1976

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
ROYALITE FINA SADDLE HILLS 6-3-76-8 (W6M)	6 Jan 1986 (2.5)	1 464	Blowout Other (Capped Gas)	Small volume of sweet gas	Equipment failure
PCP LINDBERGH 1A-7-55-5 (W4M)	11 Jan 1986 (10 min)	582	Blow Servicing (Steam/Crude Bitumen Cycle)	2 m <sup>3</sup> of oil/water mix	Equipment failure
DOME ET AL 5A2 LINDBERGH 02/5-10-56-6 (W4M)	14 Jan 1986 (9 hr)	640	Blowout Drilling	20 10 <sup>3</sup> m <sup>3</sup> sweet gas	Lost circulation/possibly caused by producing well on same location
TCRL ET AL RIBSTONE 14B-18-43-4 (W4M)	15 Jan 1986 (1 hr)	756	Blow Drilling	Small volume of sweet gas	Unexpected gas pocket
OAK ET AL ENCHANT 14-27-13-15 (W4M)	14 Mar 1986 (1.5)	874	Blow Drilling	84 10 <sup>3</sup> m <sup>3</sup> sweet gas 95 m <sup>3</sup> formation water	Swabbed well while tripping
BANFF GUYER BASHAW 10-6MU-42-22 (W4M)	12 Apr 1986 (8 hr)	1 759	Blow Other (Pump Oil)	2 m <sup>3</sup> of oil 2 m <sup>3</sup> salt water	Equipment failure
ESSO 84 H2-7 COLD LAKE 05/15-21-65-4 (W4M)	12 Apr 1986 (1.25)	452	Blowout Other (Steam/Crude Bitumen Cycle)	Small volume of sour gas (12% H <sub>2</sub> S)	Equipment failure
AMOCO BRAZEAU RIVER 10-9-45-12 (W5M)	25 Apr 1986 (7 hr)	3 416	Blowout Servicing (Capped Gas)	60 m <sup>3</sup> mixture of oil, sand and water	Very small volume of sour gas (6.7% H <sub>2</sub> S)

## BLOW AND BLOWOUT OCCURRENCES - 1986 to 1976

Well Name	Date Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
MOBIL PR CARSON 6-12-62-12 (W5M)	13 May 1986 (12 hr)	2 635.3	Blowout Other (Susp)	5 m <sup>3</sup> of oil 139 m <sup>3</sup> of produced water	Equipment failure
BUMPER ET AL ROSE CREEK 16-20-44-6 (W5M)	24 May 1986 (30 min)	2 240.5	Blow Servicing (Capped Gas)	Very small volume of sweet gas	Equipment failure 1 injury
HB ET AL JACKFISH 02/11-36-59-21 (W5M)	30 May 1986 (5 min)		Blow Servicing (Flow Gas)	Very small volume of sour gas (18.6% H <sub>2</sub> S)	Equipment failure
SUNCOR-WECO FORT KENT EX AJ/7-28-61-4 (W4M)	5 June 1986 (35 min)	366.6	Blowout Servicing Crude Bitumen Pumping	11 m <sup>3</sup> of oil/water mix	Procedural error
PEX WHITECOURT 10-18-60-11 (W5M)	27 June 1986 (2 hr)	1 680	Blowout Other (Flow Gas)	Very small volume of sweet gas	Equipment failure
HUSKY CWWE EOR BEAVDM EX AA/14-27-60-3 (W4M)	2 Aug 1986 (6 hr)	406	Blowout Other (Steam/Crude Bitumen Cycle)	1 m <sup>3</sup> of oil	Equipment failure
DOME ET AL LARNE 10-1-117-4 (W6M)	6 Aug 1986 (11)	1 439	Blowout Other (Standing Oil)	112 10 <sup>3</sup> m <sup>3</sup> sweet gas, well lost	Procedural error
PEX UNIT 1 KINSELLA B0/8-24-48-9 (W4M)	12 Aug 1986 (2)	677.6	Blowout Other (Oil well/ oxygen flood)	Small volume of sweet gas	Equipment failure

## BLOW AND BLOWOUT OCCURRENCES - 1986 to 1976

Well Name	Date	Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
COX TREND AMOCO CARSONW 14-12-62-13 (W5M)	21 Aug 1986	(12 hr)	2 773	Blowout Other (Oil)	16 $\text{m}^3$ oil/water mix	Equipment failure
ESSO 85 D22-2 COLD LAKE 03/7-11-65-4 (W4M)	22 Aug 1986	(3.75)	564	Blowout Other (Steam/Crude Bitumen Cycle)	400 $\text{m}^3$ oil/water mix	Equipment failure
PROPHET ET AL PEMBINA 02/6-25-49-6 (W5M)	28 Aug 1986	(6.5 hr)	1 809	Blowout Other (Standing Oil)	.5 $\text{m}^3$ oil, very small volume of gas (0.1% $\text{H}_2\text{S}$ )	Equipment failure
LAC ET AL MINEHEAD 6-18-49-17 (W5M)	29 Aug 1986	(5)	2 436	Blowout Servicing (Capped Gas)	56 10 $\text{m}^3$ of sweet gas; 12 $\text{m}^3$ of frac oil; 2 fatalities, 8 injuries	(Investigation not complete)
DOME ET AL GORDONDALE 8-29-78-11 (W6M)	10 Sept 1986	(12 hr)	1 878	Blowout Other (011)	.5 $\text{m}^3$ of oil 10 10 $\text{m}^3$ sour gas (1.5% $\text{H}_2\text{S}$ )	Equipment failure
IMP UNIT CDN-SUP PEM INJ 6-25-49-6 (W5M)	21 Sept 1986	(1 hr)	1 295	Blowout Other (Water Inj)	3 $\text{m}^3$ salt water	Vehicle backed into wellhead
ANADARKO ET AL HAYS 10-29-13-15 (W4M)	26 Oct 1986	(4 hr)	813.8	Blowout Other (Capped Gas)	21 10 $\text{m}^3$ sweet gas	Third-party damage
CDGOC TEEN MUSKEG EX AJ/16-9-95-7 (W4N)	18 Nov 1986	(5 hr)	185	Blowout Servicing (Crude Bitumen Pump)	2.5 $\text{m}^3$ oil/water mix	Procedural error

## BLOW AND BLOWOUT OCCURRENCES - 1986 to 1976

Well Name	Date and duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
WESTMIN BEAUVALLON 16-24-53-8 (W4M)	26 Nov 1986 (20 hr)	490	Blowout Other (Capped Gas)	Small volume of sweet gas	Third-party damage
LOMALTA TABERS 02/2-17-7-16 (W4M)	28 Nov 1986 (17)	995	Severe abnormal pressure encountered	No hydrocarbon loss	Abnormally high pressure zone, caused by adjacent water injection project
ESSO 86 J12-3 COLD LAKE 03/9-15-65-4 (W4M)	13 Dec 1986 (1)	465	Blowout Drilling	Very small volume of sweet gas	Abnormally high pressure zone, caused by adjacent steam injected project

## BLOW AND BLOWOUT OCCURRENCES - 1986 to 1976

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
SUNCOR WECO K3C FTKENT EX 9-19-61-4 (W4M)	10 Jan 1985 (3 hr)	380	Blowout Other (Steam/Crude Bitumen Cycle)	2 $\text{m}^3$ of crude bitumen and water (steam)	Equipment failure
PCI BITU 5-85-023 OV 4-19-96-10 (W4M)	19 Jan 1985 (5)	26	Blowout Drilling (Tripping)	No estimate of sweet hydrocarbon loss; major rig damage 2 injuries	Unexpected shallow gas pocket
SUNCOR WECO 15E FTKENT EX 15-20-61-4 (W4M)	23 Jan 1985 (4.5 hr)	340	Blowout Other (Steam/Crude Bitumen Cycle)	2 $\text{m}^3$ of crude bitumen and produced water; minor piping damage	Equipment failure
PCP ALDERSON 9-3-16-15 (W4M)	23 Jan 1985 (1)	1 026	Blowout Other (Flow Oil)	5 $\text{m}^3$ of oil, (0.6% H <sub>2</sub> S in gas); wellhead damage	Equipment failure
CHEVRON MGSU #1 MITSUE 13-4-70-3 (W5M)	5 Feb 1985 (9 hr)	890	Blow Drilling	No estimate of sweet hydrocarbon loss	Lost circulation
UNIGAS ET AL TOOGA 7-15-114-4 (W6M)	3 Mar 1985 (2)	218	Blowout Other (Flow Gas)	30 10 <sup>3</sup> $\text{m}^3$ sweet gas; wellhead damaged by fire	Static electricity
PARA ET AL LIEGE 7-26-94-18 (W4M)	5 Mar 1985 (3.5)	285	Blowout Other (Capped Gas)	90 10 <sup>3</sup> $\text{m}^3$ sweet gas; wellhead damage	Third-party damage, van hit the wellhead

#### 4.4 Historical Summary

#### BLOW AND BLOWOUT OCCURRENCES - 1986 to 1976

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
CDNOXY ET AL CROSSE 10-22-27-29 (W4M)	14 Mar 1985 (3 hr)	2 702	Blow Other (Flow Gas)	1 $\text{m}^3$ gas, (34% $\text{H}_2\text{S}$ )	Equipment failure
DOME LINDBERGH 5-18-55-5 (W4M)	19 Apr 1985 (4.5 hr)	592	Blowout Other (Steam/Crude Bitumen Cycle)	50 $\text{m}^3$ crude bitumen; wellhead damage	Equipment failure
PCP ALDERSON 2-4-62-2 (W5M)	24 Apr 1985 (4 hr)	738	Blowout Other (Capped Gas)	12.5 $10^3$ $\text{m}^3$ sweet gas	Third-party damage
HB UNION KAYBOBS 2-4-62-20 (W5M)	3 May 1985 (6 hr)	2 155	Blowout Other (Pump Oil)	24 $\text{m}^3$ oil, 6 $10^3$ $\text{m}^3$ gas (2% $\text{H}_2\text{S}$ ); wellhead damage	Third-party damage
LANDBANK ET AL KILLAM 11-7-43-10 (W4M)	21 June 1985 (8 hr)	637	Blowout Other (Flow Gas)	3 $10^3$ $\text{m}^3$ sweet gas; minor wellhead damage	Static electricity
CO-ENERCO ET AL CARROT 6-21-53-13 (W5M)	4 July 1985 (0.5 hr)	2 130	Blow Servicing	5 $\text{m}^3$ load oil, 2.3 $10^3$ $\text{m}^3$ gas	
CDN-SUP KEGR 10-21-103-4 (W6M)	19 July 1985 (4)	487	Blowout Other (Capped Gas)	150 $10^3$ $\text{m}^3$ sweet gas; Third-party damage wellhead damage	
JEFF LAKE ET AL JOFFRE 12-20-38-26 (W4M)	24 July 1985 (2)	2 209	Blowout Other (Pump Oil)	10 $10^3$ $\text{m}^3$ gas (4% $\text{H}_2\text{S}$ )	Equipment failure

## BLOW AND BLOWOUT OCCURRENCES - 1986 to 1976

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
WESTMIN LINDBERGH 13-05-55-5 (W4M)	26 July 1985 (0.5 hr)	513	Blowout Servicing (Crude Bitumen)	2 $\text{m}^3$ crude bitumen, 2 $10^3 \text{ m}^3$ sweet gas; crop damage	Well inadequately killed
BRACELL MOBIL HAYNES 3-14-38-24 (W4M)	27 July 1985 (3 hr)	1 853	Blow Other (Pump Oil)	No estimate of hydrocarbon loss (15% H <sub>2</sub> S)	Equipment failure
PETROMK ET AL DRUM 10-28-30-19 (W4M)	2 Aug 1985 (13 hr)	1 289	Blowout Servicing (Flow Gas)	28 $10^3 \text{ m}^3$ sweet gas; wellhead damage 1 injury	Equipment failure
SUNCOR WECO M2D FTKENT EX 4 Aug 1985 11-28-61-4 (W4M)	557 (6 hr)		Blowout Other (Steam/Crude Bitumen Cycle)	8 $\text{m}^3$ crude bitumen; minor wellhead damage	Down-hole communication between wells
SHELL 60 PRISP CADOT EX 27/AB 1.3-16-85-18 (W5M)	10 Sept 1985 (2 hr)	551	Blowout Servicing (Steam/Crude Bitumen Cycle)	5 $\text{m}^3$ crude bitumen	Well inadequately killed
DOME ET AL LINDBERGH 15-18-55-5 (W4M)	5 Oct 1985 (5 hr)	581	Blowout Other (Steam/Crude Bitumen Cycle)	No estimate of hydrocarbon loss	Equipment failure
DOME HOME AMBER 12-36-115-7 (W6M)	1 Nov 1985 (5)	1 523	Blow Drilling	No hydrocarbon loss (2% H <sub>2</sub> S)	Hole conditions, fluid density inadequate

## BLOW AND BLOWOUT OCCURRENCES - 1986 to 1976

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
WECC 10 FT KENT EX 7-28-61-4 (W4M)	7 Nov 1985 (13.5 hr)	334	Blowout Servicing (Steam/Crude Bitumen Cycle)	0.5 m <sup>3</sup> oil, 60 m <sup>3</sup> steam and produced water	Unexpected sand bridge
SUNCOR CWEC M2H FTKENT EX 14-28-61-4 (W4M)	10 Nov 1985 (1.25 hr)	350	Blow Other (Steam/Crude Bitumen Cycle)	0.2 m <sup>3</sup> crude bitumen, 6.2 m <sup>3</sup> produced water	Equipment failure
HEWITT CHEVRON GSPIKE 2-35-51-27 (W4M)	19 Nov 1985 (6 hr)	1 320	Blowout Other (Capped Gas)	No estimate of hydrocarbon loss (trace H <sub>2</sub> S)	Equipment failure
SUNCOR WECC M2F FTKENT 11-28-61-4 (W4M)	4 Dec 1985 (1.75 hr)		Blowout Servicing (Steam/Crude Bitumen Cycle)	3 m <sup>3</sup> crude bitumen, 1.3 m <sup>3</sup> salt water	Procedural error
AQUIT MOBIL RAINBOWS 7-34-107-10 (W6M)	9 Dec 1985 (6)	1 852	Blowout Servicing	170 10 <sup>3</sup> m <sup>3</sup> gas (20% H <sub>2</sub> S), 50 m <sup>3</sup> condensate	Equipment failure
AMOCO BEAVERDAM EX 16-13-59-2 (W4M)	21 Dec 1985 (0.5 hr)	546	Blow Other (Steam/Crude Bitumen Cycle)	2 m <sup>3</sup> crude bitumen and water; minor wellhead damage	Equipment failure
DOME ET AL 4B LIND EX 4-24-55-6 (W4M)	25 Dec 1985 (0.75 hr)	585	Blowout Other (Steam/Crude Bitumen Cycle)	No losses	Inadequate cementing procedures on production casing

## BLOW AND BLOWOUT OCCURRENCES - 1986 to 1976

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
DOME ET AL FERRIER 8-33-38-7 (W5M)	3 Feb 1984 (2.5)	2 610	Blowout Drilling (Coring)	706 x 10 <sup>3</sup> m <sup>3</sup> sweet gas; manifold	Abnormal pressure, equipment failure, inadequate mud weight
PEMBINA ET AL FERRIER 6-29-38-7 (W5M)	14 Feb 1984 (1.5)	2 687	Blowout Drilling (Tripping)	470 x 10 <sup>3</sup> m <sup>3</sup> sweet gas, 150 barrels of condensate	Swabbing and procedural error
PAN AM AP-2 SWAN H 02-12-67-11 (W5N)	3 Mar 1984 (30 min)	2 656	Blowout Other (Pump Oil)	No estimate of sweet hydrocarbon loss	Third-party damage, back-hoe hit wellhead
CS WESTCOAST A4 SUGDEN EX AA/6-13-63-8 (W4M)	19 Mar 1984 (3.5)	382	Blowout Servicing (Tripping)	No estimate of sweet hydrocarbon loss	Swabbing; failure to keep hole full; incorrect procedure to shut-in well
PCP ET AL PRINCESS 4-4-19-10 (W4M)	6 June 1984 (0.5)	977	Blowout Drilling (Tripping)	305 x 10 <sup>3</sup> m <sup>3</sup> sweet gas; shock hose	Swabbing and/or failure to keep hole full, equipment failure
CS CARROT 10-26-52-12 (W5M)	25 June 1984 (0.5)	2 117	Blowout Other (Pump Oil)	4.5 m <sup>3</sup> oil, 4 x 10 <sup>3</sup> m <sup>3</sup> sweet gas; wellhead damaged by fire	Equipment failure
GASCAN ET AL MITSUE 14-4-69-3 (W5M)	1 July 1984 (6 hr)	1 692	Blowout Drilling	42 x 10 <sup>3</sup> m <sup>3</sup> sweet gas	Inadequate cementing, incorrect procedure
IMP JUDY CREEK 10-3-64-11 (W5M)	5 Sept 1984 (6 hr)	2 696	Blowout Other (Pump Oil)	16 m <sup>3</sup> oil, 70 m <sup>3</sup> water and minor gas; wellhead damaged	Third-party damage, truck ran over well

## BLOW AND BLOWOUT OCCURRENCES - 1986 to 1976

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
DRUMMOND ET AL CLARESHOLM 6-30-12-25 (W4M)	24 Sept 1984 (3.5)	2 043	Blowout Other (Flow Gas)	830 x 10 <sup>3</sup> m <sup>3</sup> gas; (1% H <sub>2</sub> S), wellhead damaged	Procedural error - incorrect procedure injecting methanol
AQUIT AMOCO RICINUS 7-15-34-8 (W5M)	10 Oct 1984 (0.5)	4 121	Blowout Other (Flow Gas)	No estimate of hydro- carbon loss; (34% H <sub>2</sub> S)	Equipment failure
PAN AM CALSTAD PIGEON LAKE IR 6 16-24-46-28 (W4M)	19 Oct 1984 (7 hr)	2 155	Blowout Servicing	No estimate of hydro- carbon loss; wellhead damage	Equipment failure
DOME ET AL STRACHAN 13-8-37-9 (W5M)	23 Oct 1984 (1)	3 312	Blowout Servicing (Frac Job)	No estimate of sweet hydrocarbon loss	Procedural error
CS GRANADA 6-30-52-11 (W5M)	25 Oct 1984 (6 hr)	2 109	Blowout Other (Pump Oil)	2 m <sup>3</sup> oil; 500 m <sup>3</sup> sweet gas	Equipment failure
DEKALB ET AL NEVIS 10-35-40-22 (W4M)	26 Oct 1984 (0.5)	376	Blowout Servicing (Frac Job)	1.4 x 10 <sup>3</sup> m <sup>3</sup> sweet gas; minor wellhead damage	Equipment failure
HB BRAZEAU RIVER 7-31-46-14 (W5M)	29 Nov 1984 (0.5)	3 655	Blowout Other (Flow Gas)	5300 m <sup>3</sup> gas; (19.7% H <sub>2</sub> S)	Equipment failure
RANGER GULF EDSON 11-11-53-20 (W5M)	30 Nov 1984 (5 min)	2 111	Blowout Other (Flow Gas)	No estimate of sweet hydrocarbon loss	Equipment failure

## BLOW AND BLOWOUT OCCURRENCES - 1986 to 1976

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
GULF RAINBOW 11-36-110-6 (W6M)	14 Dec 1984 (30 min)	1 650	Blowout Other (Capped Gas)	No estimate of hydrocarbon loss; (0.96% H <sub>2</sub> S) 1 injury	Third-party damage, truck moving service rig damaged wellhead
UNION SLAVE 14-36-83-14 (W5M)	15 Dec 1984 (5 hr)	1 750	Blowout Other (Flow Oil)	No estimate of sweet hydrocarbon loss; minor wellhead damage well	Third-party damage, 4-wheel drive seismic tractor backed into well
GASCOME N. FRONTIER RAIN S 10-22-107-10 (W6M)	30 Jan 1983 (0.5)	1 961	Blowout Servicing (Rigging Up)	9.5 m <sup>3</sup> oil, 1400 m <sup>3</sup> gas (trace H <sub>2</sub> S); minor wellhead damage	Service rig backed into well, broke valve off
TENN N-6 HUSSAR 15-3-25-21 (W4M)	20 Feb 1983 (1)	1 475	Blowout Other (Capped Oil)	20 m <sup>3</sup> oil; 18 400 m <sup>3</sup> sweet gas	Equipment failure
UNION BOYER 11-10-102-24 (W5M)	26 Feb 1983 (1 hr)	357	Blowout Other (Flow Gas)	No estimate of sweet hydrocarbon loss; minor wellhead damage	Third-party damage. Grey nipple knocked off wellhead by caterpillar tractor
CONGASCOME ET AL. SHEKILIE 12-14-118-8 (W6M)	27 Feb 1983 (9)	1 794	Blowout Drilling (Logging)	610 x 10 <sup>3</sup> m <sup>3</sup> gas (2% H <sub>2</sub> S)	Lost circulation
SUNCOR ET AL. FTKENT 3-15-61-5 (W4M)	13 Mar 1983 (1)	343	Blow Drilling (Tripping)	No estimate of sweet gas loss	Swabbing; Procedural error (drill pipe and collars dropped down hole)

## BLOW AND BLOWOUT OCCURRENCES - 1986 to 1976

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
QUINTANA ET AL GOLDEN 9-24-86-15 (W5M)	16 Mar 1983 (2)	1 620	Blow Drilling (Cementing)	50.0 10 <sup>3</sup> m <sup>3</sup> of sweet gas	Inadequate mud density
HOME ESSO KITSCLY 3B-2-51-2 (W4M)	17 Mar 1983 (4)	603	Blowout Other (Steam/Oil Cycle)	330 m <sup>3</sup> water; 220 m <sup>3</sup> oil, no estimate of sweet gas; wellhead damaged	Equipment failure
HB UNION KAYBOB S 10-5-62-20 (W5M)	22 Mar 1983 (4 hr)	2 177	Blowout Other (Pump Oil)	13 m <sup>3</sup> oil; 13 300 m <sup>3</sup> gas (1.5% H <sub>2</sub> S)	Equipment failure
PETROMK ET AL UTIKUMA 2-16-81-9 (W5M)	11 May 1983 (4 hr)	1 744	Blowout Other (Steam/Crude Bitumen Cycle)	35 m <sup>3</sup> oil; 400 m <sup>3</sup> gas; minor wellhead damage	Third-party damage. Casing valve broke off wellhead by truck
PCP GLEICHEN 6-11-23-21 (W4M)	22 May 1983 (7 hr)	801	Blowout Servicing (Re-installing wellhead)	No estimate of sweet hydrocarbon loss 1 injury	Wellhead blown off; cross-threaded
YORK 2TV 3 IN DECALTA 6-20-18-2 (W5M)	28 June 1983 (3 min)	2 446	Blow Servicing (Tripping)	No estimate of sweet hydrocarbon loss; 3 injuries	Trapped gas in tubing, suddenly released at surface

## BLOW AND BLOWOUT OCCURRENCES - 1986 to 1976

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
NORCEN K9 PROVO EX C1 6-17-37-1 (W4M)	6 July 1983 (1)	743	Blowout Other (Air Inj)	No estimate of sweet hydrocarbon loss; wellhead and tubing damage	Direct cause unknown, 3 jts tubing blown out of well
MERLLAND DEMAY 1-17-48-19 (W4M)	18 July 1983 (2)	481	Blowout Other (Susp Gas)	No estimate of sweet hydrocarbon loss	Inadequate cement job on production casing string (surface casing vent blow)
CS WESTCOAST SUGDEN EX 6-13-63-8 (W4M)	2 Aug 1983 (1)	380	Blow Servicing	2 m <sup>3</sup> sweet gas	Equipment failure
GULF AMOCO CAROLINE 8-17-36-6 (W5M)	5 Sept 1983 (2)	529	Blow Drilling (Tripping)	No estimate of sweet hydrocarbon loss	Swabbing
GCON ET AL AQUIT LENDRUM 6-17-48-19 (W5M)	17 Sept 1983 (5 min)	95	Blow Servicing (Re-entry)	No estimate of sweet hydrocarbon loss	Unanticipated high pressure gas below bridge plug
SIGNALTA ET AL PEMBINA 4-31-50-6 (W5M)	28 Sept 1983 1 712 (6 hr)	Blowout Other (Susp Gas)	14 000 m <sup>3</sup> gas, minor water	Third-party damage, casing valve broken off wellhead by truck	
IMP JUDY WEST 10-18-63-11 (W5M)	3 Nov 1983 (2 hr)	2 657	Blow Other (Pump Oil)	30 m <sup>3</sup> oil; 4200 m <sup>3</sup> sweet gas	Equipment failure
TEXACO C4 WIZARD 8-16MU-48-27 (W4M)	8 Nov 1983 (1)	1 886	Blowout Servicing (Installing BOPs)	740 x 10 <sup>3</sup> m <sup>3</sup> sweet gas	Equipment failure

## BLOW AND BLOWOUT OCCURRENCES - 1986 to 1976

Well Name	Date and Duration (days)	Depth (metres)	Occurrence	Loss	Cause
PACIFIC AMOCO RICINUS 15-12-36-9 (W5M)	21 Nov 1983	2 617	Blowout Other (Flow Gas)	5000 m <sup>3</sup> sweet gas	Equipment failure
INDEX ET AL PEMBINA 14-11-50-4 (W5M)	22 Nov 1983	1 585 (0.5)	Blow Drilling	No estimate of sweet hydrocarbon loss	Inadequate mud density
CANHUNTER ET AL MUDDY 7-1-68-12 (W6M)	14 Jan 1982	2 441 (2 min)	Blow Servicing (Wireline Operations)	No estimate of sweet hydrocarbon loss; wireline truck, 3 pick-ups, minor service rig damage 5 injuries	Equipment failure
HB ZAMA NORTH 12-11-116-6 (W6M)	14 Jan 1982	1 546 (1.5)	Blowout Other (Flow Oil)	14 m <sup>3</sup> oil; 7 m <sup>3</sup> gas; (9% H <sub>2</sub> S)	Equipment failure
DONE SULPETRO VALHALLA 8-23-74-9 (W6M)	18 Jan 1982	2 042 (4)	Blowout Drilling (Tripping)	3600 x 10 <sup>3</sup> m <sup>3</sup> gas (trace H <sub>2</sub> S), 150 barrels condensate	Failure to keep hole full while tripping out, followed by BOP failure
SUNCOR WECO FT KENT EX 4-28-61-4 (W4M)	26 Jan 1982	396 (1)	Blow Servicing	No estimate of sweet hydrocarbon loss 1 injury	Equipment failure
MYROL BVX STETN 6-19-39-19 (W4M)	28 Jan 1982	1 345 (1)	Blowout Other (Flow Gas)	280 x 10 <sup>3</sup> m <sup>3</sup> sweet gas; minor wellhead damage	Third-party damage
C&T ET AL MEDR 14-20-39-3 (W5M)	2 Feb 1982	2 142 (1)	Blowout Servicing (Tripping)	33 m <sup>3</sup> oil; 450 m <sup>3</sup> gas; 8 m <sup>3</sup> salt water	Underbalanced fluid column in wellbore, insufficient kill fluid density

## BLOW AND BLOWOUT OCCURRENCES - 1986 to 1976

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
CANSTAR CALUMET OV 2-24-98-12 (W4M)	11 Feb 1982 (13)	65	Blowout Drilling	85 x 10 <sup>3</sup> m <sup>3</sup> sweet gas; rig burned	Unexpected shallow gas sand, no BOPs installed
GAO JOLI FOU 7-32-80-20 (W4M)	14 Feb 1982 (0.5)	369	Blow Other (Crude Bitumen)	3 m <sup>3</sup> oil	Equipment failure
CANTERRA ET AL RAINBOW 8-15-109-8 (W6M)	3 Mar 1982 (6)	1 782	Blow Drilling (Tripping)	No estimate of hydrocarbon loss (trace H <sub>2</sub> S)	Failure to keep hole full
HB SHEKILLIE 4-11-118-8 (W6M)	10 Mar 1982 (2.5)	1 737	Blowout Servicing (Removing Wellhead)	2 m <sup>3</sup> oil; 300 m <sup>3</sup> gas (trace H <sub>2</sub> S); wellhead and service rig damaged	Winch line parted, dropping horsehead onto wellhead
UNIGAS ET AL SOUSA 6-11-112-4 (W6M)	15 Mar 1982 (0.5)	260	Blowout Other (Standing Gas)	No estimate of sweet hydrocarbon loss; wellhead damaged	Third-party damage
UNION SLAVE 8-23-84-14 (W5M)	23 Mar 1982 (0.5)	78	Blow Drilling	No estimate of sweet hydrocarbon loss	Unexpected shallow gas zone
PROCOR FT SASK LPG STORAGE 16D-1-56-22 (W4M)	11 Apr 1982 (1)	1 909	Blowout Other (Storage)	875 m <sup>3</sup> butane; 3 buildings and pumps 1 injury	Equipment failure
CIGOL BIG LK 10-22-53-26 (W4M)	29 Apr 1982 (19)	1 430	Blowout Other (Susp Gas)	No estimate of sweet hydrocarbon loss	Lake ice damaged equipment
PCP ALDERSON 14-15-15-15 (W4M)	16 May 1982 (0.5)	762	Blow Drilling (Tripping)	No estimate of sweet hydrocarbon loss	Failure to keep hole full while tripping

#### 4.4 Historical Summary

#### BLOW AND BLOWOUT OCCURRENCES - 1986 to 1976

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
CAIRN ET AL WAYNE 6-10-27-20 (W4M)	1 June 1982 (1)	1 424	Blowout Other (Flow Oil)	No estimate of sweet hydrocarbon loss; wellhead and pumpjack damaged	Equipment failure
AMERADA STURLS 1-20-69-22 (W5M)	10 June 1982 2 (0.5)	602	Blowout Other (Flow Oil)	7 $\text{m}^3$ oil; 1.4 $\times 10^3$ $\text{m}^3$ gas (9% $\text{H}_2\text{S}$ )	Equipment failure
DIASHAN AMOCO SPRUCE V 7-14-67-19 (W4M)	14 July 1982 (1)	370	Blowout Other (Flow Gas)	2.8 $\times 10^3$ $\text{m}^3$ sweet gas; minor wellhead damage	Foremost all terrain vehicle ran into wellhead, broke off 12-mm valve
IMP HB FENNBV 2-26-36-20 (W4M)	3 Sept 1982 (1)	1 594	Blowout Servicing (Rigging Up)	2.5 $\text{m}^3$ oil; 180 $\text{m}^3$ gas (1.5% $\text{H}_2\text{S}$ )	Well improperly killed
REGAL ET AL PENBINA 6-11-47-3 (W5M)	7 Sept 1982 (1)	285	Blowout Other (Pump Oil)	No estimate of sweet hydrocarbon loss	Inadequate cement top behind production casing (surface casing vent blow)
DECALTA LEDUC 10-36-48-26 (W4M)	17 Sept 1982 1 (1)	385	Blowout Other (Standing Gas)	No estimate of sweet hydrocarbon loss	Third-party damage
GULF ET AL CRINCON 7-5-38-8 (W5M)	21 Sept 1982 2 (1)	926	blow drilling (Coring)	250 $\times 10^3$ $\text{m}^3$ sweet gas	abnormal formation pressure
CAMP TAMEKACK LADCO NW 1/4-26-70-6 (W6M)	14 Oct 1982 (1)	198	blowout drilling	5 $\times 10^3$ $\text{m}^3$ sweet gas	water well driller had no tool equipment

## BLOW AND BLOWOUT OCCURRENCES - 1986 to 1976

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
AMOCO DOME BRAZEAU RIVER 13-12-48-12 (W5M)	17 Oct 1982 (67)	3 066	Blowout Drilling (Coring)	150 to 220 10 <sup>6</sup> m <sup>3</sup> gas (includes 25% H <sub>2</sub> S and practices and equipment failures 100 to 160 10 <sup>3</sup> m <sup>3</sup> gas equivalent of gas condensate), drilling rig, 2 deaths (well control personnel), 300 hectares of forest	Combination of unsatisfactory (see Lodgepole Blowout Report D 84-9, Section 12.1.1)
WESTCOAST AEC SUFFIELD 5-10-20-8 (W4M)	6 Nov 1982 (2)	887	Blow Drilling (Tripping)	25 x 10 <sup>3</sup> m <sup>3</sup> sweet gas; minor rig damage; 3 injured	Failure to keep hole full
FIRST DEV ET AL PEMBINA 4-28-50-12 (W5N)	19 Nov 1982 (1 hr)	100	Blow Servicing (Re-enter abandoned well)	No estimate of sweet hydrocarbon loss	Abnormal pressure due to inadequate abandonment
MOBIL PRISM RAIN 12-13-110-6 (W6M)	20 Nov 1982 (11)	1 853	Blowout Servicing (Installing Wellhead)	275 x 10 <sup>3</sup> m <sup>3</sup> gas (1.5% H <sub>2</sub> S); service rig and wellhead damaged	Well inadequately killed
SUN MEDR 12-8-39-3 (W5M)	26 Nov 1982 (30 min)	2 206	Blow Servicing (Hot Oil Job)	2 m <sup>3</sup> oil	Polish rod hydrauliced out of stuffing box and broke off
GULF ET AL FERRIER 6-18-38-8 (W5M)	1 Dec 1982 (1)	2 930	Blow Drilling (Coring)	130 x 10 <sup>3</sup> m <sup>3</sup> sweet gas	Abnormally pressured formation

## BLOW AND BLOWOUT OCCURRENCES - 1986 to 1976

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
SECURITY GARRS 6-21-33-3 (W4M)	2 Dec 1982 (1)	1 938	Blow Servicing (Frac Job)	15 m <sup>3</sup> oil	Equipment failure
LUSCAR ET AL FORESTBURG 4-29-41-15 (W4M)	9 Jan 1981 (0.5)	174	Blow Drilling (Tripping)	No estimate of sweet hydrocarbon loss	Swabbing
TOTAL ATMORE 3-34-67-16 (W4M)	10 Jan 1981 (15 min)	356	Blow Drilling (Tripping)	No estimate of sweet hydrocarbon loss	Failure to keep hole full
ESSO COLD LAKE 27A 6-27-64-3 (W4M)	20 Jan 1981 (2)	525	Blowout Other (Crude Bitumen)	No estimate of sweet hydrocarbon loss	Equipment failure (Casing)
MERLAND ET AL KINSELLA 6-2-46-8 (W4M)	1 Feb 1981 (2)	638	Blowout Servicing (Installing BOPs)	210 x 10 <sup>3</sup> m <sup>3</sup> sweet gas	Well improperly killed
VOYAGER ET AL NORRIS 9-5-54-18 (W4M)	7 Feb 1981 (2 hr)	188	Blow Drilling (Tripping)	No estimate of sweet hydrocarbon loss	Swabbing
CS RAINBOW 3-32-109-5 (W6M)	15 Feb 1981 (2 hr)	1 367	Blow Drilling (Tripping)	6 m <sup>3</sup> oil; no estimate of sweet gas; minor rig damage 1 injury	Failure to keep hole full

## BLOW AND BLOWOUT OCCURRENCES - 1986 to 1976

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
CHEROKEE RETLAW 6-32-11-18 (W4M)	26 Feb 1981 (1.5)	1 075	Blow Drilling (Tripping)	$250 \times 10^3 \text{ m}^3$ sweet gas	Swabbing
POC ET AL OBED 2-22-52-22 (W5N)	28 Mar 1981 (1 hr)	4 225	Blow Servicing (Logging)	$6 \times 10^3 \text{ m}^3$ gas (32% H <sub>2</sub> S); minor service rig fire damage	Equipment failure
HB ET AL BRAZK 8-7-48-13 (W5M)	25 Apr 1981 (6)	3 379	Blow Drilling (Tripping)	No estimate of hydrocarbon loss (0.6% H <sub>2</sub> S)	Swabbing
PETROFINA TEST HOLE B5 13-6-51-7 (W5M)	15 May 1981 (1)	201	Blowout Drilling	$28 \times 10^3 \text{ m}^3$ sweet gas; fire damage to rig 2 injuries	Air drilling with no diverter or BOPs
BANFF GUYER BASHAW 10-6MU-42-22 (W4M)	2 June 1981 (4)	1 760	Blowout Other (Pump Oil)	$1 \times 10^3 \text{ m}^3$ gas; 1 m <sup>3</sup> oil; (12% H <sub>2</sub> S)	Equipment failure
CHAMPLIN WHITECOURT 9-17-60-11 (W5M)	24 June 1981 (1)	1 602	Blow Other (Capped Gas)	$40 \times 10^3 \text{ m}^3$ sweet gas	Inadequate cement job on production casing string (surface casing vent blow)
HUBER TWINING 2-18-32-24 (W4N)	4 July 1981 (6)	1 684	Blowout Other (Susp Oil)	$8 \times 10^3 \text{ m}^3$ sweet gas; 4 m <sup>3</sup> oil; minor wellhead damage	Third-party damage

## BLOW AND BLOWOUT OCCURRENCES - 1986 to 1976

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
CLP COLD LAKE 9-7-63-2 (W4M)	14 July 1981 (1)	260	Blowout Other (Flow Gas)	$10 \times 10^3 \text{ m}^3$ sweet gas	Third-party damage
BP ET AL LAMBERT 15-33-41-23 (W5M)	22 July 1981 (13)	4 414	Blow Drilling	No estimate of sweet hydrocarbon loss	Lost circulation
GAO ET AL FERRIER 10-17-40-9 (W5M)	23 July 1981 (1)	2 683	Blow Drilling	No estimate of sweet hydrocarbon loss	Abnormally pressured formation
HUSKY LLOYD 13-15-51-1 (W4M)	22 Aug 1981 (0.5)	49	Blow Drilling	No estimate of sweet hydrocarbon loss	Unexpected shallow gas pocket
GULF PECO 7-30-47-15 (W5M)	15 Sept 1981 (30 min)	2 503	Blow Drilling (Fishing)	No estimate of sweet hydrocarbon loss	Pipe parted while jarring stuck DST tools
TEXACO ATHABASCA I-23 12-15-88-8 (W4N)	16 Sept 1981 (12)	354	Blowout Other (Air Inj)	No estimate of sweet hydrocarbon loss; casing and minor wellhead damage	Equipment failure
ROZSA KNAPPEN 9-6-2-11 (W4M)	25 Sept 1981 (2)	794	Blow Drilling (Tripping)	$500 \times 10^3 \text{ m}^3$ sweet gas	Failure to keep hole full
SUNCOR COVEY NO. 11-7 11-7-47-27 (W4N)	16 Oct 1981 (1 hr)	2 159	Blowout Servicing (Tripping)	No estimate of sweet hydrocarbon loss	Well not properly killed

## BLOW AND BLOWOUT OCCURRENCES - 1986 to 1976

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
CHEVRON BLGU 3 KAYBOB S 4-35-58-18 (W5N)	1 Nov 1981 (0.5)	3 396	Blowout Servicing (Tripping)	$125 \times 10^3 \text{ m}^3$ gas (18% H <sub>2</sub> S); 125 m <sup>3</sup> condensate, 16 m <sup>3</sup> salt water	Well not properly killed
BA PAN-AM RHONDA SWANH 4-14-66-11 (W5M)	8 Nov 1981 (1)	2 593	Blowout Other (Pump Oil)	No estimate of sweet hydrocarbon loss	Equipment failure
HB SHEKILLIE 9-16-118-8 (W6M)	18 Nov 1981 (4)	1 548	Blowout Drilling (Circulating)	$1600 \times 10^3 \text{ m}^3$ gas (0.66% H <sub>2</sub> S); rig destroyed	Lost circulation
ASHLAND ET AL PEMBINA 11-33-50-8 (W5M)	22 Nov 1981 (1)	1 914	Blowout Other (Standing Gas)	No estimate of sweet hydrocarbon loss	Equipment failure
PARA ET AL WILD RIVER 10-8-55-25 (W5M)	30 Nov 1981 (2)	2 665	Blowout Other (Standing Oil)	No estimate of sweet hydrocarbon loss; wellhead damaged	Equipment failure
IMP CDN SUP PEMBINA 16-29 BR-48-6 (W5M)	10 Dec 1981 (1)	1 404	Blow Servicing (Installing BOPs)	No estimate of sweet hydrocarbon loss	Wellhead froze, bonnet on master valve split

## BLOW AND BLOWOUT OCCURRENCES - 1986 to 1976

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
DOME AMOCO EUREKA 3-33-82-10 (W6M)	2 Jan 1980 (1)	1 916	Blowout Other (Flow Gas)	$60 \times 10^3 \text{ m}^3$ sweet gas; wellhead damaged 1 injury	Equipment failure
PAN-AM CANSO A-1 NITON 12-15-55-13 (W5M)	9 Jan 1980 (1)	1 972	Blowout Servicing (Clean-out Job)	No estimate of sweet hydrocarbon loss; wellhead damaged	Equipment failure
WESTCOAST ET AL BUFFALO 14-17-22-6 (W4M)	31 Jan 1980 (1)	775	Blow Drilling (Tripping)	$28 \times 10^3 \text{ m}^3$ sweet gas	Failure to keep hole full; mud density inadequate
PANCANA MURPHY ATLEE 4-19-21-5 (W4M)	5 Feb 1980 (6)	840	Blow Drilling (Tripping)	No estimate of sweet hydrocarbon loss	Lost circulation
BLAKE ET AL STEEN 10-9-11-2-1 (W6M)	7 Feb 1980 (25)	70	Blowout Drilling	No estimate of sweet hydrocarbon loss, major rig fire damage 2 injuries	Unexpected shallow gas sand
BLAKE ET AL SOUSA 10-11-11-2-2 (W6M)	2 Mar 1980 (1)	265	Blow Drilling	No estimate of sweet hydrocarbon loss	Inadequate mud density
WESTGROWTH ET AL VIRGO 12-36-11-4-6 (W6N)	11 Mar 1980 (1)	1 501	Blow Other (Susp Well)	1 $\text{m}^3$ oil; wellhead	Third-party damage
CHEVRON STEELE 13-20-65-24 (W4M)	18 Mar 1980 (0.5)	1 233	Blow Drilling (Tripping)	No estimate of sweet hydrocarbon loss	Swabbing; failure to keep the hole full

## BLOW AND BLOWOUT OCCURRENCES - 1986 to 1976

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
CANHUNTER TEXACO ELM 10-35-71-13 (W6M)	19 June 1980 2 (2)	007	Blowout Servicing (Installing BOPs)	$5.7 \times 10^6 \text{ m}^3$ sweet gas	Well was not properly killed
DOME MORGAN 6B-35-51-4 (W4M)	5 July 1980 (2 hr)	586	Blowout Servicing (Installing Wellhead)	9 $\text{m}^3$ oil	Swabbing
NUGATE OAK PCP ALDERSON 8-14-16-15 (W4M)	29 July 1980 1 (1)	041	Blow Drilling (Tripping)	$10 \text{ m}^3$ oil, $28 \times 10^3 \text{ m}^3$ sweet gas	Failure to keep hole full and/or swabbing
DOME PECO 6-1-47-16 (W5M)	10 Sept 1980 3 (1)	864	Blowout Other (Susp Gas)	No estimate of hydro-carbon loss (20% $\text{H}_2\text{S}$ )	Casing valves left open; tubing parted and gas escaped out the open valve
HOME PACIFIC KNAPPEN 16-29-1-11 (W4M)	12 Sept 1980 (1)	760	Blow Servicing (Rigging Up)	$29 \times 10^3 \text{ m}^3$ sweet gas	Equipment failure
WHITEHALL BUX ZAMA 4-20-116-6 (W6M)	18 Sept 1980 1 (2)	409	Blow Other (Susp Gas)	$100 \times 10^3 \text{ m}^3$ gas; (2% $\text{H}_2\text{S}$ )	Production casing failure due to corrosion (surface casing vent blow)
ESSO CHIEFCO RILEY 6-25-42-17 (W5M)	24 Sept 1980 5 (1)	300	Blow Drilling	No estimate of hydro-carbon loss (trace $\text{H}_2\text{S}$ )	Abnormally pressured formation

## BLOW AND BLOWOUT OCCURRENCES - 1986 to 1976

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
CHEVRON CLARK 10-2-59-18 (W5M)	2 Oct 1980 (1)	3 272	Blow Servicing (Killing Well)	No estimate of hydrocarbon loss (8% H <sub>2</sub> S); minor rig damage	Equipment failure
HB SWIMMING 6-8-52-6 (W4M)	8 Oct 1980 (1 hr)	680	Blow Drilling	No estimate of sweet hydrocarbon loss	Lost circulation
CLARION ET AL BONNYVILLE 6-36-60-6 (W4M)	11 Oct 1980 (2 hr)	327	Blowout Other (Susp Gas)	No estimate of sweet hydrocarbon loss; minor wellhead damage	Third-party damage
FINA AMOCO HB WIND 9-2-61-16 (W5M)	17 Oct 1980 (4 hr)	2 533	Blow Servicing (Tripping)	No estimate of hydrocarbon loss (20% H <sub>2</sub> S)	Stabbing valve in tubing left open, well kicked in
TEXACO WIZARD LAKE B-2 5-22-48-27 (W4M)	28 Oct 1980 (1)	1 938	Blowout Servicing (Tripping)	No estimate of sweet hydrocarbon loss	Lubricator removed before wireline pulled
TREND FBA 13-24-56-24 (W4M)	21 Oct 1980 (3 hr)	1 062	Blow Servicing (Standing)	7 m <sup>3</sup> oil; 40 x 10 <sup>3</sup> m <sup>3</sup> sweet gas	Casing valve left open overnight
LUISKY GCD NORTH KITSCLTY NO. 28 8-18-51-2 (W4M)	28 Nov 1980 (3 hr)	577	Blowout Servicing (Installing BOPs)	42 m <sup>3</sup> oil; 14 m <sup>3</sup> salt water	Well improperly killed prior to servicing
RENAISSANCE PETM EDWARD 7-10-61-17 (W4M)	1 Dec 1980 (3)	648	Blowout Drilling	570 x 10 <sup>3</sup> m <sup>3</sup> sweet gas, rig burned	Lost circulation; surface casing split 1 injury

## BLOW AND BLOWOUT OCCURRENCES - 1986 to 1976

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
MESA CAROLINE 5-28-34-06 (W5M)	10 Jan 1979 (4)	1 975	Blowout Servicing (Drilling)	480 m <sup>3</sup> oil; 120 x 10 <sup>3</sup> m <sup>3</sup> sweet gas	Poor cement job over Cardium
CDNOXY ET AL EAGLESHAM 9-9-77-25 (W5M)	18 Jan 1979 (1)	1 805	Blow Drilling (Tripping)	No estimate of sweet hydrocarbon loss	Swabbing
COMPADRE SIBBALD 6-25-27-2 (W4M)	29 Jan 1979 (0.5)	904	Blow Drilling (Tripping)	No estimate of sweet hydrocarbon loss	Swabbing; lost circulation
MOBIL WCT CARSON N 6-34-61-12 (WM)	16 Feb 1979 (1.5)	2 623	Blowout Other (Water Inj)	No estimate of sweet hydrocarbon loss; casing valve	Equipment failure
SHELL RANDALL 12-10-81-2 (WM)	26 Feb 1979 (1)	484	Blowout Drilling	No estimate of sweet hydrocarbon loss; fire damage to rig	Failure of bleed-off hose on blowey line while air drilling
AQUIT RAINBOW S 4-1-108-10 (W6M)	27 Feb 1979 (0.5)	1 902	Blowout Other (Pump Oil)	No estimate of hydro-carbon loss (4% H <sub>2</sub> S); stuffing box, flow tee	Equipment failure
RUPERTS ET AL MITSUE 11-32-71-3 (W5M)	11 Apr 1979 (7)	1 660	Blow Drilling	1400 x 10 <sup>3</sup> m <sup>3</sup> sweet gas	Lost circulation
IMPERIAL WOODBEND #74 8-8-51-26 (W4M)	17 Apr 1979 (1.5 min)	1 622	Blowout Servicing (Pumping Oil)	1.6 m <sup>3</sup> oil	Human error, incorrect procedure

## BLOW AND BLOWOUT OCCURRENCES - 1986 to 1976

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
BLUESKY PETROMARK KING SUNNY N 7-5-25-9 (W4M)	4 May 1979 (3 hr)	872	Blowout Other (Capped Gas)	$0.7 \times 10^3$ m <sup>3</sup> sweet gas	Wellhead came off - improperly installed
TEXACO MCNURRAY STEAM PROJECT 15-88-8 (W4M)	11 June 1979 (12)	1.36	Blowout Other (Crude Bit)	No estimate of sweet hydrocarbon loss	Equipment failure
AMOCO ET AL BEARBERRY 10-32-32-7 (W5M)	13 June 1979 (1)	2 894	Blowout Servicing (Frac Job)	$113 \times 10^3$ m <sup>3</sup> sweet gas	Equipment failure
NORCEN ET AL WESTLOCK 11-23-59-27 (W4N)	21 June 1979 (0.5)	730	Blow Drilling (Circulating)	No estimate of sweet hydrocarbon loss	Lost circulation
AMOCO GRANADA 3-29-52-11 (W5M)	27 Aug 1979 (1.5)	2 090	Blowout Servicing (Frac Job)	$140 - 280 \times 10^3$ m <sup>3</sup> sweet gas	Equipment failure
HARRY W BASS ET AL EDSON 7-26-51-19 (W5M)	30 Aug 1979 (7)	3 088	Blowout Other (Susp Gas)	No estimate of hydrocarbon loss (2% H <sub>2</sub> S)	Equipment failure (casing)
PCP NUMAC TANGENT 6-32-80-23 (W5M)	30 Sept 1979 (1)	1 118	Blow Drilling (Tripping)	$25 \times 10^3$ m <sup>3</sup> sweet gas	Failure to keep hole full
ESSO UNION MUSREAU 16-28-64-6 (W6M)	3 Oct 1979 (1)	2 653	Blow Drilling (Cementing)	No estimate of sweet hydrocarbon loss	Insufficient cement column behind intermediate casing

## BLOW AND BLOWOUT OCCURRENCES - 1986 to 1976

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
PACIFIC EMPRESS 13-35-19-1 (W4M)	6 Oct 1979 (0.5)	617	Blow Drilling (Tripping)	460 $\text{m}^3$ sweet gas	Failure to keep hole full
ZAPATA ET AL FORESTBURG 11-23-40-15 (W4M)	13 Oct 1979 (1)	961	Blow Other (Susp Gas)	No estimate of sweet hydrocarbon loss; gauge needle valve	Possible vandalism - Equipment failure
MOBIL UNIT BHL CARSON N 14-1-62-12 (W5M)	27 Oct 1979 (1)	2 647	Blow Drilling (Tripping)	$28 \times 10^3 \text{ m}^3$ sweet gas	Failure to keep hole full; hole in surface casing at 36 m
KISSINGER ET AL MILLS 7-35-70-11 (W4M)	7 Nov 1979 (0.5)	515	Blow Drilling (Fishing)	No estimate of sweet hydrocarbon loss	Swabbing with fishing tools
AMOCO ET AL STEEP 7-28-66-7 (W6M)	22 Nov 1979 (3)	2 338	Blowout Drilling (Fishing)	$280 \times 10^3 \text{ m}^3$ sweet gas	Swabbing with fishing tools
BRASCAN ET AL RANFURLY 2-5-51-12 (W4M)	23 Nov 1979 (0.5)	600	Blowout Servicing (Tripping)	No estimate of sweet hydrocarbon loss	Lost circulation
GLENORA ET AL GUNN 10-8-55-3 (W5M)	2 Dec 1979 (6 hr)	1 304	Blow Other (Shut in)	No estimate of sweet hydrocarbon loss	Insufficient cement column behind production casing
GLENIS ET AL SIBBALD 10-16-28-2 (W4M)	7 Dec 1979 (1)	774	Blow Drilling (Cementing)	$27 \times 10^3 \text{ m}^3$ sweet gas	Lost circulation

## BLOW AND BLOWOUT OCCURRENCES - 1986 to 1976

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
HB BL GAS UNIT 2 KAYBOB S 6 Jan 1978 3 322	Blowout Servicing (Stripping in)	$610 \times 10^3 \text{ m}^3$ gas (18% H <sub>2</sub> S)	Tubing slips jammed in BOPs		
2-19-60-18 (W5M) (4.5)					
PCP WINTERING HILLS 10-16-25-18 (W4M)	23 Jan 1978 (3.5)	1 304	Blowout Other (Flow Gas)	No estimate of sweet hydrocarbon loss; casing valve	Equipment failure
NORCEN SIEBENS JUMPPUFF 8-18-20-19 (W4M)	12 Mar 1978 (5 min)	1 341	Blow Drilling (Tripping)	No estimate of sweet hydrocarbon loss; fire damage to rig 5 injuries	Swabbing; fire caused by drawworks motors
GULF MINNEHIK BUCK LAKE 9-25-44-6 (W5M)	14 Mar 1978 (3)	1 739	Blowout Other (Standing Gas)	$250 \times 10^3 \text{ m}^3$ gas; 32 m <sup>3</sup> water; minor wellhead damage	Failure to cement above shallow hydrocarbon zone
IPEX ET AL SUNDRE 2-22-34-5 (W51)	18 Mar 1978 (3)	2 685	Blowout Servicing	$21 \times 10^3 \text{ m}^3$ sweet gas; wellhead damage	Equipment failure - tubing injector unit (hot oil) failed
ATKINSON MCLEOD 7-34-54-14 (W5N)	22 Mar 1978 (1)	1 476	Blowout Other (Flow Gas)	$200 \times 10^3 \text{ m}^3$ sweet gas	Equipment failure (casing)
COX SOUTHEASTERN FERRIER 10-36-38-7 (W5M)	13 Apr 1978 (4 hr)	2 089	Blowout Other (Susp Oil)	6 m <sup>3</sup> oil; 1 m <sup>3</sup> sweet gas; casing valve, nipple	Third-party damage
GULF MEEKWAP 1-2-67-15 (W51)	19 Apr 1978 (1)	2 328	Blowout Other (Pump Oil)	32 m <sup>3</sup> oil, minor sour gas (6% H <sub>2</sub> S)	Equipment failure

## BLOW AND BLOWOUT OCCURRENCES - 1986 to 1976

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
REDCO PORCUPINE L BOW 10-32-14-18 (W4M)	5 July 1978 (1.5)	1 119	Blow Drilling (Tripping)	$170 \times 10^3 \text{ m}^3$ sweet gas	Insufficient mud density
MESA LL&E ATLEE 4-13-21-6 (W4M)	8 July 1978 (0.5)	934	Blow Drilling (Tripping)	$420 \times 10^3 \text{ m}^3$ sweet gas	Swabbing
HUSKY GNOL CHAUVINS 6-30-42-1 (W4M)	14 Aug 1978 (0.5)	547	Blow Drilling (Tripping)	No estimate of sweet hydrocarbon loss	Insufficient mud density
CALSTAN MEEKWAP 2-3-65-19 (W5M)	30 Aug 1978 (4 hr)	2 952	Blow Servicing	$95 \text{ m}^3$ water; $16 \text{ m}^3$ oil	Insufficient kill fluid density
HB STURGEON LAKE S 1-25-68-22 (W5M)	12 Oct 1978 (2)	2 563	Blow Other (Pump Oil)	$1 \text{ m}^3$ oil, minor sour gas, (9% H <sub>2</sub> S)	Equipment failure
CDN-SUP ONOWAY 7-11-55-2 (W5M)	20 Oct 1978 (6)	580	Blow Other (Capped Gas)	$160 \times 10^3 \text{ m}^3$ sweet gas	Failure to cover shallow gas zone with cement when cementing production casing
DOME EUREKA 7-36-82-11 (W6M)	1 Nov 1978 (1)	1 861	Blowout Other (Shut-in Gas)	$340 \times 10^3 \text{ m}^3$ sweet gas	Equipment failure
DOME EUREKA 7-36-82-11 (W6M)	11 Nov 1978 (1)	1 861	Blowout Servicing	$280 \times 10^3 \text{ m}^3$ sweet gas; wellhead flow-line	Equipment failure

## BLOW AND BLOWOUT OCCURRENCES - 1986 to 1976

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
NICH WIS BISTCHO 11-35-122-2 (W6M)	14 Nov 1978 (1)	1 504	Blow Other (Susp Gas)	No estimate of sweet hydrocarbon loss	Equipment failure
WINCAN TEXFEL PEMBINA 8-29-50-9 (W5N)	20 Nov 1978 (6 hr)	1 497	Blowout Other (Standing)	No estimate of sweet hydrocarbon loss	Incorrect procedure
CANHUNTER ET AL KARR 10-4-65-2 (W6i1)	7 Dec 1978 (1.5)	2 283	Blowout Other (Standing)	No estimate of sweet hydrocarbon loss; damage to wellhead	Third-party damage
ANSCHUTZ ET AL CHIGWELL 7-22-41-25 (W4M)	12 Jan 1977 (1)	1 571	Blowout Servicing (Swabbing)	No estimate of sweet hydrocarbon loss	Master valve washed out
SUN OMEGA ENCHANT 7-6-14-17 (W4M)	19 Jan 1977 (3)	815	Blowout Other (Susp Gas)	110 x 10 <sup>3</sup> m <sup>3</sup> sweet gas; wellhead valves	Third-party damage
DOME LPGS ST. SASK 11B-14-55-22 (W4M)	28 Jan 1977 (20 min)	1 929	Blow Servicing	160 - 240 m <sup>3</sup> sweet gas; casing damage	Equipment failure
ASHLAND LONGCO 6-6-17-20 (W4M)	16 Feb 1977 (12)	1 340	Blow Drilling (Tripping)	8.5 x 10 <sup>3</sup> m <sup>3</sup> sweet gas	Insufficient mud density
SHELL 35 WATERTON 12-9-3-30 (W4M)	28 Feb 1977 (2)	3 148	Blowout Drilling (Tripping)	60 - 140 10 <sup>3</sup> m <sup>3</sup> gas (14% H <sub>2</sub> S)	Swabbing

## BLOW AND BLOWOUT OCCURRENCES - 1986 to 1976

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
DOME LPGS FT. SASK. 15B-14-55-22 (W4M)	13 Mar 1977 (2 hr)	964	Blowout Drilling (Standing)	$30 \times 10^3 \text{ m}^3$ sweet gas	Loss of hydrostatic head while repairing mud pump
PAN AM BA U-22 SWAN HILLS 21 Mar 1977 2 592 2-6-66-10 (W5M)	(0.5)		Blowout Servicing (Tripping)	$32 \text{ m}^3$ salt water; 16 $\text{m}^3$ oil	Failure to keep hole full
DOME HB NITON 6-23-55-13 (W5M)	6 June 1977 (2)	906	Blowout Other (Capped Gas)	$560 \times 10^3 \text{ m}^3$ sweet gas; wellhead	Third-party damage
PACIFIC AMOCO BRAZ 11-31-48-12 (W5M)	6 June 1977 (13)	3 075	Blow Drilling	No estimate of sweet oil	Encountering drilling break, abnormally high pressure
TEXACO B-1 WIZARD 12-22MU-48-27 (W4M)	10 June 1977 (1)	2 042	Blowout Servicing (Tripping)	7100 $\text{m}^3$ sweet gas	Equipment failure
BLUERMONT ET AL PROVOST 10-7-39-9 (W4M)	10 Aug 1977 (2 hr)	788	Blowout Other (Shut-in Gas)	No estimate of sweet hydrocarbon loss; 114.3-mm valve	Third-party damage
PACIFIC AMOCO RICINUS 12-6-35-8 (W5M)	8 Sept 1977 (1)	4 272	Blowout Other (Flow Gas)	No estimate of sour gas (28% H <sub>2</sub> S); master valve	Equipment failure
MERLAND CNW WESTLOCK 7-3-60-26 (W4M)	13 Oct 1977 (1)	487	Blow Drilling (Tripping)	$28 \times 10^3 \text{ m}^3$ sweet gas; rig damaged 1 injury	Failure to keep hole full

## BLOW AND BLOWOUT OCCURRENCES - 1986 to 1976

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
WESTCOAST AEC SUFFIELD 8-13-20-8 (W4M)	4 Dec 1977 (2)	940	Blowout Drilling (Tripping)	$115 \times 10^3 \text{ m}^3$ sweet gas	Swabbing
AMOCO PACIFIC BRAZ R 7-10-48-12 (W5M)	6 Dec 1977 (28)	3 311	Blowout Drilling (Tripping)	$16 \times 10^6 \text{ m}^3$ gas (25% H <sub>2</sub> S); rig destroyed	Swabbing; low mud density; frozen equipment
AQUIT MOBIL RAINBOW 6-18-109-7 (W6M)	15 Dec 1977 (1)	1 824	Blowout Drilling (Coring)	No estimate of sweet hydrocarbon loss 7 injuries	Failure to keep hole full
GAMMA ET AL CESSFORD 6-30-23-10 (W4M)	19 Dec 1977 (33)	952	Blowout Drilling (Tripping)	$1860 \times 10^3 \text{ m}^3$ sweet gas; rig destroyed	Swabbing
GULF POC GOLD RIVER 6-18-70-15 (W4M)	20 Dec 1977 (1.5)	506	Blowout Drilling (Cementing)	$60 \times 10^3 \text{ m}^3$ sweet gas	Loss of cement hydrostatic head due to lost circulation zone
AMOCO F-52 GREG. 8-27-85-8 (W4M)	24 Jan 1976 (0.5)	354	Blowout Servicing	$37 \times 10^3 \text{ m}^3$ sweet gas; 6 - 8 $\text{m}^3$ oil; wellhead damaged	Equipment failure
VOYAGER KILLIAN N 10-33-45-13 (W4M)	7 Feb 1976 (2.5)	269	Blowout Other (Capped Gas)	$110 \times 10^3 \text{ m}^3$ sweet gas; casing bowl	Equipment failure

## BLOW AND BLOWOUT OCCURRENCES - 1986 to 1976

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
FINA AMOCO HB WIND 12-6-61-15 (W5M)	21 Mar 1976 (12)	2 529	Blowout Other (Gas Inj)	17 900 x 10 <sup>3</sup> m <sup>3</sup> sour gas (20% H <sub>2</sub> S)	Gas leak at wellhead
STAR TRICINT SUNNYBROOK 10-22-48-2 (W5M)	22 Mar 1976 (6 hr)	882	Blowout Other (Capped Gas)	14 x 10 <sup>3</sup> m <sup>3</sup> sweet gas; wellhead damage	Procedural error; equipment failure
HUSKY DEVONIA LAKE 4A-29-49-1 (W4M)	1 May 1976 (3 hr)	607	Blow Servicing (Tripping)	8 m <sup>3</sup> oil	Swabbing
DOMESTIC WATER WELL NE 1/4-20-47-7 (W5M)	3 June 1976 (1)	85	Blowout Drilling	No estimate of sweet hydrocarbon loss	Lost circulation
PACIFIC SUNDANCE VERMIL 7-30-50-6 (W4M)	10 June 1976 (2 hr)	554	Blow Other (Flow Gas)	No estimate of sweet hydrocarbon loss	Equipment failure; hammer union downstream from choke washed out
GULF ET AL STOLBERG 10-31-41-14 (W5M)	16 Aug 1976 (0.5)	4 214	Blow Servicing (Installing Wellhead)	7 x 10 <sup>3</sup> m <sup>3</sup> gas (3% H <sub>2</sub> S)	Equipment failure
GK ET AL STAR 6-7-56-19 (W4M)	19 Aug 1976 (1)	897	Blow Drilling	280 x 10 <sup>3</sup> m <sup>3</sup> sweet gas	Lost circulation
TEXACO WIZARD CROWN B-10 13-22-48-27 (W4M)	26 Aug 1976 (2)	2 010	Blowout Servicing (Installing Packer)	170 x 10 <sup>3</sup> m <sup>3</sup> sweet gas	Ports in retainer of packer assembly accidentally opened resulting in flow from tubing

## BLOW AND BLOWOUT OCCURRENCES - 1986 to 1976

Well Name	Date and Duration (days)	Depth (metres)	Occurrence Operation	Loss	Cause
IMP LEDUC 13-9-50-26 (W4M)	27 Aug 1976 (0.5)	1 641	Blow Other (Flow Gas)	8 m <sup>3</sup> oil; wellhead	Damaged wellhead
MOBIL DUHAMEL 3-29MU-45-21 (W4M)	15 Oct 1976 (2)	1 258	Blowout Servicing (Rigging Up)	140 x 10 <sup>3</sup> m <sup>3</sup> sweet gas	Equipment failure
HUSKY FORESTBURG 6-28-42-13 (W4M)	22 Nov 1976 (4 hr)	915	Blowout Other (Susp Gas)	No estimate of sweet hydrocarbon loss; wellhead damage	Third-party damage
ASHLAND ET AL ATHAE 7-6-67-21 (W4M)	27 Dec 1976 (1.5)	588	Blowout Servicing	110 x 10 <sup>3</sup> m <sup>3</sup> sweet gas	Failure to keep hole full





